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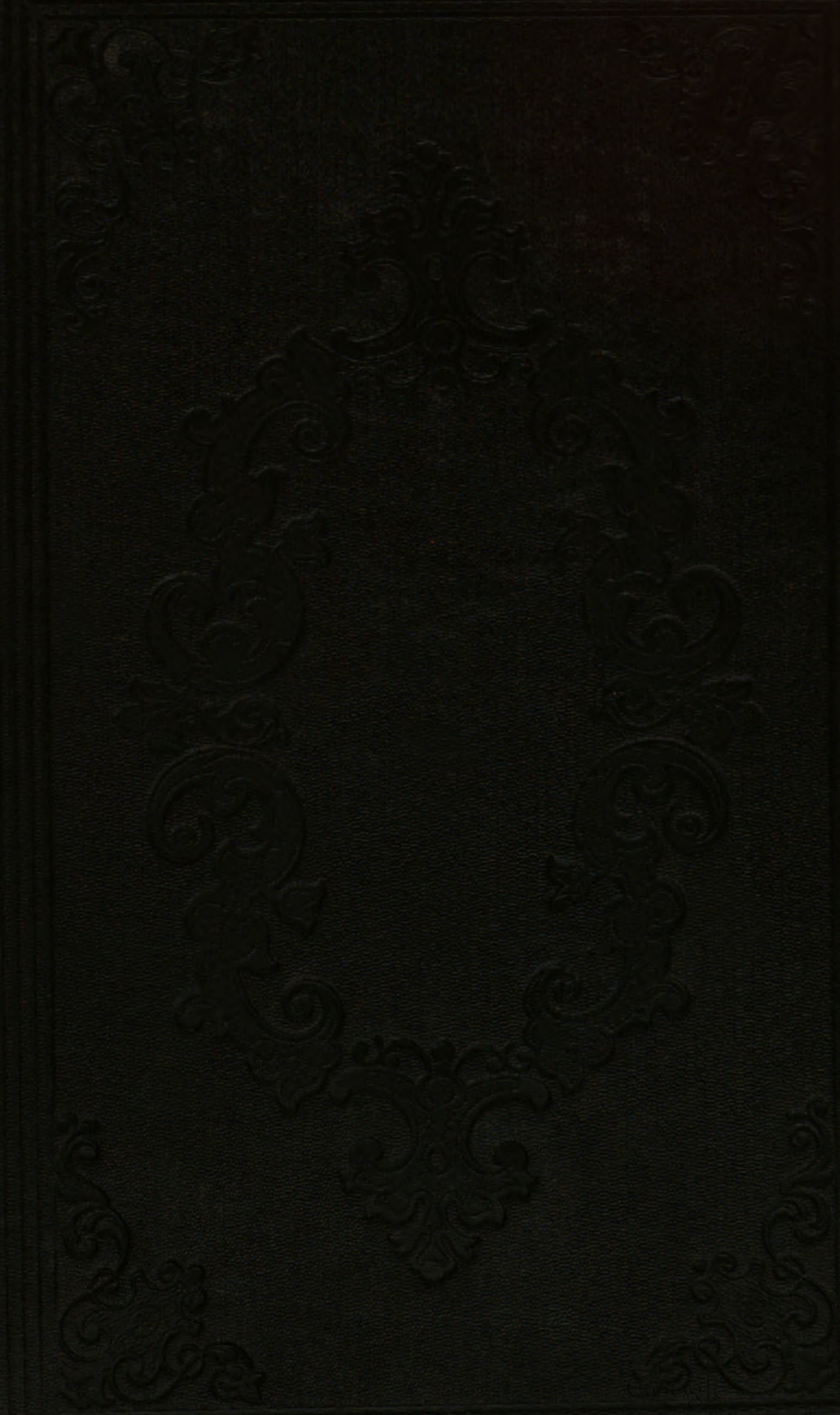

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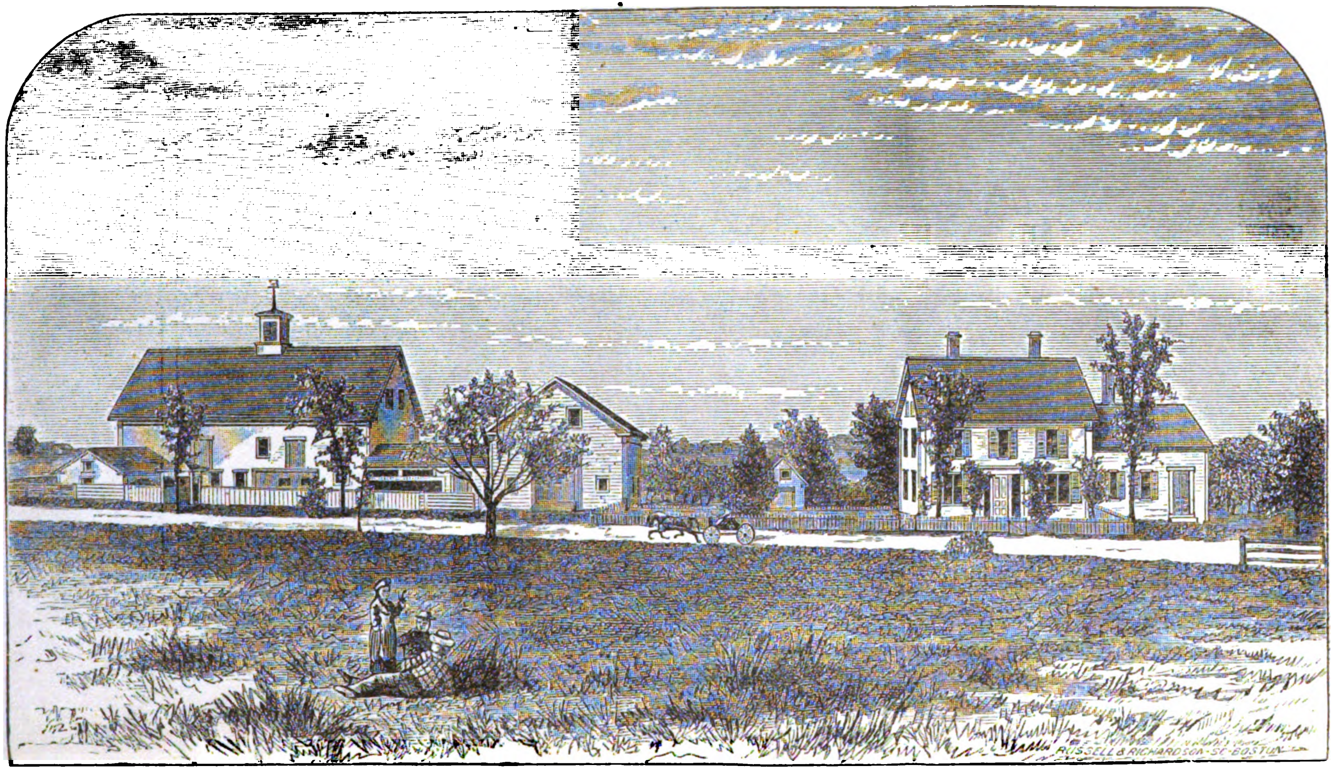

RESIDENCE AND FARM BUILDINGS OF IRA E. GETCHELL, PRESIDENT OF THE MAINE BOARD OF AGRICULTURE, WINSLOW;
[P. O. Address, NORTH VASSALBORO'.]

Carleton, Photographer, Waterville.

TWENTY-SECOND ANNUAL REPORT

OF THE

SECRETARY

OF THE

MAINE BOARD OF AGRICULTURE,

FOR THE YEAR

1877.

AUGUSTA:
SPRAGUE, OWEN & NASH, PRINTERS TO THE STATE.
1877.

MAINE BOARD OF AGRICULTURE.

IRA E. GETCHELL, President.
W. W. HARRIS, Vice President.
S. L. BOARDMAN, Secretary.

Members at Large appointed by the Governor and Council.

Name.	P. O. Address.	Term expires Dec. 31.
M. C. Fernald	Orono	1877
Henry Carmichael	Brunswick	1877
C. F. Allen	Orono	1879
George E. Brackett	Belfast	1879
D. M. Dunham	Bangor	1879

Member chosen by State Agricultural Society.

B. M. Hight	Skowhegan	1877

Member chosen by State Pomological Society.

J. A. Varney	North Vassalboro'	1878

Member chosen by Maine Poultry Association.

W. W. Harris	Portland	1877

Member chosen by Maine Dairyman's Association.

J. R. Nelson	Winthrop	1879

Members chosen by County Societies.

Ira E. Getchell	Kennebec	N. Vassalboro'	1877
Z. A. Gilbert	Androscoggin	East Turner	1877
Lyman H. Winslow	Lincoln	Nobleboro'	1877
C. W. Hersey	Washington	Pembroke	1877
P. W. Ayer	Waldo	Freedom	1877
Horace Bodwell	York	Acton	1878
Thomas Reynolds	Oxford	Canton	1878
J. Marshall Brown	Cumberland	Portland	1878
George Flint	Somerset	North Anson	1878
Isaac E. Mallett	Sagadahoc	Topsham	1878
Samuel Wasson	Hancock	East Surry	1879
John Thissell	Penobscot	East Corinth	1879
J. O. Keys	Franklin	North Jay	1879
H. L. Leland	Piscataquis	East Sangerville,	1879
Nathaniel Alford	Knox	South Hope	1879
C. Hayford	Aroostook	Maysville Cent'r.	1879

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INTRODUCTION.

To the Honorable Senate
and House of Representatives:

In accordance with the provisions of the statue, I have the honor to transmit the Annual Report of the State Board of Agriculture for the year 1877. At the annual meeting, which was held at Newport, Feb. 20th–22d, Ira E. Getchell of Winslow was elected President; W. W. Harris of Portland, Vice President; and Samuel L. Boardman of Augusta, Secretary. The usual standing committees were appointed, and the incoming members qualified, after which an address of welcome to the Board in behalf of the citizens of Newport, was given by Don. A. H. Powers, Esq., when the public exercises of the convention opened.

In accordance with a vote of the Board at its previous session, the subject of Indian corn and its cultivation formed the topic of leading discussion, the treatment of the same under the various heads having been previously assigned to different members. These papers and discussions occupy the first fifty pages of the accompaning report, and present a compact body of history, statistics and information upon this most important crop, which our farmers would do well to carefully study, before the opening of another season's work. The opening of the discussion having been assigned to myself, I desire to make acknowledgement in this place to the authorities consulted in the preparation of that paper, which I could not well do in the lecture itself. Beside the reports of the various State Boards of Agriculture, and agricultural societies, the general and special cyclopœdias, the reports of the

National Department of Agriculture, and the agricultural press—mention should be made of the following sources of facts and opinions: The work on Indian corn by William Cobbett, published at London in 1828; Transactions of the Essex county (Mass.) Agricultural Society for 1849; Sixth Report of the Massachusetts State Board of Agriculture, 1858, containing the very able treatise on this subject, by Hon. Charles L. Flint; the history, culture and varieties of Indian corn, by Hon. J. H. Klippart, published as an appendix to his treatise on the Wheat Plant, 1860; Indian corn, its value, culture and uses, by Edward Enfield, 1856; articles by B. F. Johnson in the Fifth Report of the Illinois Industrial University, 1873, and Transactions of the Illinois Department of Agriculture for 1875; Inventory of the Food Collection of the South Kensington Museum, London, 1872, and Mr. Edward Smith's treatise on Foods, London, 1873.

In addition to the treatment of this subject, numerous essays and lectures were presented by members of the Board and other gentlemen, most of which are published in full, in the following pages. Where not so published, they related to subjects, which have heretofore received the attention of the Board, or were withheld at the request of their authors. Among others, and bearing directly upon one of our leading industries, was that of Hon. John L. Hayes of Boston, on Wool Production and Sheep Husbandry, which forms one of the most important contributions to the present volume.

The meeting at Newport was one of the largest in point of attendance, and one of the most successful in results that the Board has ever held. Meridian Hall, the use of which was generously given to the Board by the citizens of the place, was crowded during the entire convention, and the meeting could apparently have been continued for a number of days to decided profit.

The semi-annual meeting, in accordance with a vote of the Board, was held at Alfred, in York county, on the 16th–18th of October. At this meeting, by previous assignment, the subject of manures formed the leading topic, the report of which will be found on page 169. The main object of their discussion was not to treat the subject with completeness, but to take up some important, but rather obscure points which have not heretofore received much attention from the Board. These related to our imports and exports of manures and fertilizing substances, the value of liquid manures with the methods of their application, and the use of muscle bed as a fertilizer. Upon these points valuable information was elicited, as the full report will show.

At the annual meeting at Newport, the Committee on Topics made the following recommendations: "That there be appointed a committee of four to report at our next session what measures, if any, should be taken to enlarge the scope, increase the facilities and promote the efficiency of the agricultural department of the State College; and that the exercises of the students on the last day of the coming session be mainly confined to reports upon the experimental and practical workings of the college, so far as that work relates to purely agricultural pursuits."

In accordance with this vote, the exercises of the students of the State College, who were in attendance at the meeting, had special reference to the experimental work of the college in the agricultural department during the season, and a selection from the reports thus presented, is given on page 236, and susebquent pages of this volume. They show good work on the part of the students, and were presented in such a manner as to receive the hearty approval and commendation of all present. Following these, a lecture given by Prof. Carmichael, before the Board at its meeting at Fryeburg, is published in full, taking the place of the lecture on the work of experiment stations, delivered at Alfred.

It is believed that the leading subjects given in the accompanying report, are among the most important that can be presented to the farmers of Maine. When it is realized that we purchase annually nearly THREE MILLIONS of bushels of corn, and pay out over $325,000 for commercial fertilizers of different kinds—it is time our farmers turned their attention to the husbanding and enlarging the home resources of manures, and to growing more corn and wheat for our own consumption. I doubt if the Board of Agriculture could make a better disposition of that portion of the State Bounty to agricultural societies over which it exercises control, than to devote it to the encouragement of these two great food crops of our people; and I earnestly hope, at its coming meeting, this matter will be given a careful consideration.

At this date two or three local societies have failed to make the report to me, which by law they are compelled to make, but as some unforeseen or Providential matter may have caused the delay, (which I am daily expecting to receive) I omit in their place the table of returns from such societies, showing the amount of monies expended, &c., which will be given in the second part of the volume.

The cheese factories in the State are not compelled to make returns of their operations to me, but I have sent out to such as were known to have been in operation during the year, blanks for a statement of their doings, and have replies from twenty-seven, against thirty-five in 1876. But in the returns for 1876 are reports from thirteen factories not heard from in 1877, and the returns for 1877 give reports from seven factories not reported as in operation in 1876. In 1875, there were sixty cheese factories in operation in this State; and in 1876 returns were received from but thirty-five—yet it is believed that the business of associated dairying in Maine had not depreciated to the extent indicated by the less number of factories from which returns were received in the last named year. The fairer inference is that many factories from having made a less amount of cheese in 1876 than in 1875, refused to make any report to any source from which a statement of their business would be likely to be made public. Taking these facts into consideration, it is fair to say that any statement of the amount of factory cheese made in this State in any one year is rather comparative than accurate, and is to be taken with some allowance. The full returns from these factories will appear in a subsequent part of the "Agriculture of Maine" for 1877–8.

The year has been one of satisfactory returns to the farmer, and the impetus given to the growing of wheat and Indian corn by the public agitation of the importance of these crops to our agriculture, through the press and the public meetings of the Board, has resulted in the production of a very large increase of these crops over previous years, the results of which can but stimulate our farmers to greater exertions in the same line of effort in the future. The rewards of such a course will be abundant and sure. But little damage was done in our State during the year by the Colorado beetle, although it is believed to be very generally introduced. The timely warning given our farmers of its approach, through circulars from this Board, and the advantage in fighting them we are able to avail ourselves of from the experiences of our Western neighbors, will enable us, it is hoped, to keep them in check to such an extent that great injury will not follow their presence in our State.

The State College has passed a most prosperous year, and is more firmly grounded in the good will of the people of the State than ever before in its history. Measures are now being taken by the Trustees to render it more distinctively and purely a school of Agriculture and the Industrial Arts, which effort I feel sure will be heartily seconded by our citizens.

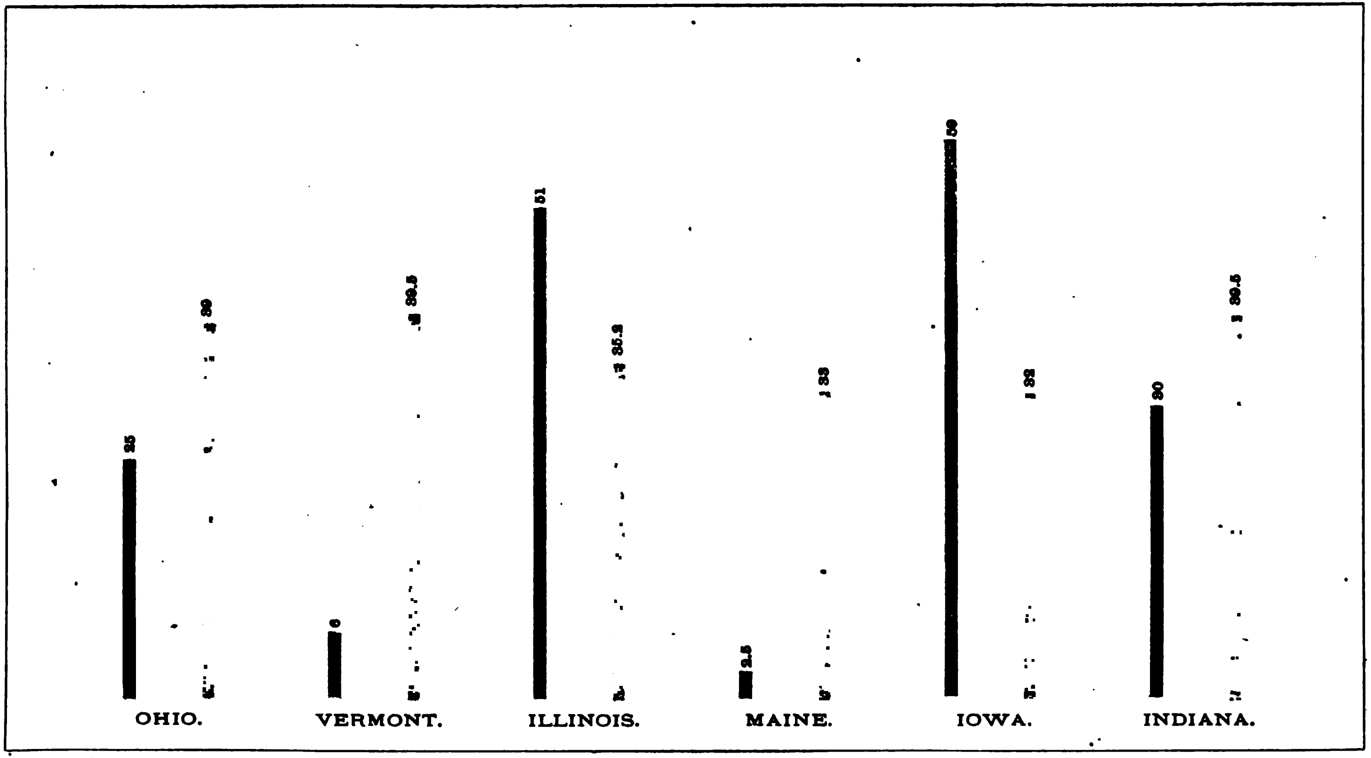
I much regret, that owing to severe and protracted illness during the printing of a portion of my report, several pages were obliged to go to press without a final revision of the proofs, and that in consequence several errors have crept into one or two forms. The reader, is therefore requested to make the following corrections of the press:

On page 71, seventh paragraph, for "miller," read midge; page 74, first paragraph, in all places where the word "gnats" occurs, read ants; page 75, fifth paragraph, last line, for "tents," read belts; page 101, second paragraph, for "grapes" read grass; page 102, for "colens," read coleus; for "stabria," read salvia ; for "bar," read var ; for "centanceas," read centaurias ; for "achyremthes," read achyranthus ; page 103, for "zennias" read zinnias ; for "helitropes," read heliotropes ; page 111, third line from top, insert the word thousand, between the word "fifty" and "bales," so that the sentence shall read, "one hundred and thirty to one hundred and fifty thousand bales." A few other unimportant errors the reader will naturally correct.

Respectfully submitted,

SAMUEL L. BOARDMAN, *Secretary*.

OFFICE OF STATE BOARD OF AGRICULTURE,
Augusta, Dec. 25, 1877.



Red—Yield per capita in bushels.
Yellow—Yield per acre in bushels.

LINE-EXHIBIT OF YIELD OF INDIAN CORN IN SEVERAL STATES—1870.

MAINE BOARD OF AGRICULTURE.

PAPERS AND DISCUSSIONS

AT THE ANNUAL MEETING AT

NEWPORT, FEB. 20th, 21st and 22d, 1877.

INDIAN CORN.

I. Historical and Introductory.

BY THE SECRETARY OF THE BOARD.

It was decided by the Committee on Topics, at the last session of the Board of Agriculture, that Indian Corn should furnish the leading subject of thought and discussion at this meeting. It was subdivided into four sections, which were given out for treatment to members of our Board—the first division, that relating to the history, varieties, chemical composition and statistics, having been assigned to myself. It is, I assure you, a broad and intricate theme, demanding for its satisfactory presentation greater ability than I have ever laid claim to; and in the time I am to occupy, I can only glance at the points involved. The gentlemen who are to follow me to-day and to-morrow, each have most important divisions of this subject to present to you; and they have indicated to me in the correspondence we have found it necessary to have upon the matter, that they each had the most difficult part of this great subject assigned to them—an evidence of the vastness of any one of the branches of our agriculture, which only presents itself in its magnitude and importance, whenever we sit down to thoughtfully and persistently study it. As for myself, I need to ask your indulgence beforehand, and if I make mistakes, you will be so good as to acknowledge I go astray in good company, and belong to a large and quite respectable portion of the community.

And first, a few words concerning the name; which, as some writer has said, is called "Indian" because it did not come from India,—which may be reasonably doubted, however—and "corn" because it is not corn at all, but something else. It is indeed one of the natural grasses, and has been called by botanists, *Zea Mays*, the genus *zea* comprising but a single species, though an almost endless number of varieties; so far as this country is concerned, at least, and possibly throughout the world; the other species described by M. Hueze, five in number, being really sports, or vegetable curiosities, and not with either accuracy or justice to be classed as species.

It is a curious fact, that *zea* comes from a Greek word meaning to live, because of the great amount of nutritive matter which it contains; while maize in the Gaelic or Irish is "food." In the Lettish and Livonic languages of the north of Europe *mayse* means "bread." The word corn comes from the Saxon "corn," the Dutch koorn, and the Danish, German and Swedish, "korn." In England corn means all grain, but especially wheat, while in our country the courts of one State at least—Pennsylvania—have decided that "corn" means maize: Indian corn.

Botanically, maize is characterized by its monœcious flowers forming a terminal panicle or tassel, each spiklet containing two flowers, each with two palæ and three stamens. Or in other words, it has both male and female flowers, the tassel being the male portion, and the silk the female—being unlike the flowers of the wheat plant, which are hermaphrodite, or male and female flowers both included, and each forming a portion of the same flower. The male or fertile flowers of maize (the ear) form a long dense spike, completely enveloped in a number of floral leaves (husks) from which the thread-like stigmites (silk) protrude several inches. The spiklets, as in the male, contain two flowers, but they have no stamens—one flower has an ovary with a long style ending in the thread-like forked stigmite, the other flower has only two empty palæ.

The origin of maize, if not unknown, is a disputed matter among naturalists; and its early history is obscured by the shadows of the most remote antiquity. And notwithstanding writers on the subject lament the dearth of information, and the poverty of knowledge accessible to the student concerning its origin and history, yet I have found that a careful study of what *has* been written upon the subject, is somewhat bewildering to a person seeking to know just exactly where Indian corn originated, and what has been its history—for all our useful and cultivated plants have a history which is often as interesting as that of individuals who have taken a conspicuous part in the great affairs of the world. Indeed, the history of some plants is so intimately connected with the progress of civilization as to be inseparable from the annals of kingdoms and peoples. It will only be necessary for our present purpose, however, to examine very briefly some of the theories and facts which have been put forth regarding the origin and history of the plant under consideration.

Among the most famous and enthusiastic admirers of this grand plant, was that able English reformer and defender of the people against all forms of oppression and monopoly, William Cobbett, who in 1828, introduced it into England from this country, attempted to give his own name to it, and was so infatuated with its valuable properties that he ate it constantly, smoked its leaves, planted it, and wrote a treatise upon it, some parts of which were printed on paper made from the husks. He believed that the allusions frequently made to "corn" in the Bible, could have had reference to no other plant than our maize or Indian corn. Mr. Flint expresses the belief that the misconception of Cobbett in regard to the Biblical language, arose from his ignorance of the ancient mode of sowing wheat or as it was universally called by the old writers "corn." Large fields of it were sown, between which a narrow road or path was left for the public —a road just wide enough for the team to pass without injury to the grain, there being no fences for protection, so that the "going through the corn-fields" might indeed be taken literally. It was sometimes gathered with the sickle, and sometimes by passing through the field and plucking off the heads or ears, the reaper having an apron or pouch into which to drop them. But for myself I am more than half inclined to believe Cobbett was right in his inferences;—at any rate no one who has read his comments upon these Biblical passages, can fail to admire the enthusiasm with which he states his case, and the truthfulness of his applications of these passages to the modern practices relating to the culture and uses of our maize. Listen to some of these scriptural quotations:

In 2d Kings, 4th chapter, 42d verse, it is said "There came a man from Baal-shalisha, and brought the man of God twenty loaves of barley, and full ears of corn in the husks thereof, and said, give unto the people that they may eat." In Leviticus, 2d chapter, 14th verse, there is an injunction to offer as a "meat offering of first fruits unto the Lord, green ears of corn dried by fire, even corn beated out of full ears." In Deuteronomy, 23d chapter, 24th and 25th verses, there is a command respecting the conduct of persons who may be in need of food, in these words: "When thou comest into thy neighbor's vineyard then thou mayest eat grapes thy fill, at thy own pleasure; but thou shalt not put any in thy vessel. When thou comest into the standing corn of thy neighbor, then thou mayest pluck the ears with thine hand; but thou shall not move the sickle into thy neighbor's corn." In Leviticus, 23d chapter, 14th verse, the Israelites are told: "We shall eat neither bread nor parched corn, nor green ears, until the selfsame day, until you have brought an offering unto your God." In the account of Pharaoh's dreams, in Genesis, 41st chapter, 5th verse, it is recorded: "And he slept and dreamed a second time; and, behold, seven ears of corn came up upon one stalk, rank and good." In Job, 24th chapter, 24th verse, it is said that the wicked, though they flourish and hold up their heads for a while, are "cut off as the *tops* of the ears of the corn."

Now, if one will study this matter closely and apply these passages to the operations of farmers in our own day in harvesting and using the crop, it will not be a difficult thing I imagine for him to come to a similar conclusion as did Cobbett. But Cobbett is not alone in assigning to maize an Eastern origin. M. Bonafous, a learned and ingenious native of Sardinia, about whom I can gather no personal information, but whom I find quoted in all the writings on this subject, wrote a work on the native country and history of Indian corn, which was published at Paris in 1836, in which he maintained that maize was of Eastern or Chinese origin; and although some of the most celebrated botanists and savans combatted this opinion—among them Humboldt and De Candolle—there has of late years been a growing belief in the minds of persons of authority that Bonafous was right in his conjecture, if not in his arguments. Modern botanists have advanced the opinion, that as neither North or South America possess plants allied to maize, and as Eastern Asia has them in numbers, and as it is true, as a general statement, that plants of allied families are quite sure to be found growing together, it has therefore been inferred—taken together with the fact that *zea mays* was first correctly described and illustrated in a Chinese work written in 1552—that the plant has an Asiatic origin. The inference to be drawn from the above is, that at a period so remote we have no record of it, America and Asia were connected by land with Behring's Straits, and over this old highway of an ancient civilization came a vast immigration from Eastern Asia, bringing to what afterwards became the New World, the maize plant, the seeds of the Catalpa, Honey Locust and other seeds and plants. This coming from Asia to America might have occurred by other means than across Behring's Straits, since within the memory of man, there have been several shipwrecks and castaways of junks from China and Japan on the Atlantic islands —junks drifting with passengers, crew and cargo, safe and sound 2,500 miles from home, and landing on the northwest coast of North America. It should not be forgotten in considering this theory, that Columbus died in the belief that he had discovered the eastern extremity of the Continent of Asia or farther India. The possibility, therefore, of such an origin of maize, may become a probabilty, if learned antiquarians succeed in establishing the fact that America was discovered by Chinese Buddist priests, at least a thousand years before its discovery by Columbus, to which matter Mr. Leland's recently issued volume is devoted. Bock, a botanist who wrote only forty years after the discovery of America, asserts that Indian corn came from Arabia, and was called *wheat of Asia*, *great wheat* and *great reed*. Ruellius, who wrote a few years later than Bock (and whose assertions all modern writers deem worthy of high respect), asserts that the plant came from Arabia. Fuchsius, an ancient writer, also declares that it came from Asia to Greece, and thence to Germany, where it was called "wheat of Turkey," because the Turks at that time controlled all Asia. Crescenzi, the father of Italian agriculture, who flourished about 1250, and who is said to have given the best information about the agriculture of antiquity of any writer of his time—describes the method of cultivating this plant in his day, which is the same as that of cultivating our maize of the present day; and Sata Roza de Viterbo, a Portuguese writer, asserts that maize was known in the thirteenth century. Travellers who have visited the Asiatic isles, have inferred that it was cultivated about the equator, in that vicinity, from great antiquity, and that it passed from these isles into China, and thence to the interior about the Himalaya mountains. John Crawford, who lived for years in the island of Java, and who published an account of his travels, says:

"Maize is, next to rice, the most important agricultural product among the great tribes of the Indian Archipelago." Finally, Mr. Rifaud asserts that some kernels of maize were found, in 1819, in the sarcophagus of a mummy at Thebes, after the lapse of thirty or forty centuries.

Now a few words must be said regarding the statements of those who have believed that maize is indigenous to this country, and that to the New World should belong the honor of having given it to the Old. And here will be found the names of distinguished scientists who differ from the writers quoted above, concerning the origin of the plant, the difference being mainly a purely technical one, and turning on the point as to whether the plant described on an old chart of Incisa of the thirteenth century, as *meliga* or "wheat of Turkey," was identical with the *zea mais*. Gerard, in describing several kinds of Turkey wheat, which were evidently species of maize, says: "These kinds of grain were first brought into Spain and then into the other provinces of Europe, not (as some suppose) out of Asia Minor, which is in the Turk's dominions, but out of America and the Islands adjoining, as out of Florida and Virginia, or Norembega, where they used to sow or set it, and to make bread of it, where it groweth much higher than in other countries." M. E. Discourtilz says maize was introduced into Europe by the Spaniards, who brought it from Peru; and Thomas Nuttall, the old American naturalist, believed it to be indigenous to tropical America. Finally, Baron Humboldt says: "It is no longer doubted among botanists, that maize or Turkey corn is a true American grain. On the discovery of America by the Europeans, the *zea maize* was cultivated from the most southern part of Chili to Pennsylvania"—and he might have said to this section, for such was really the case. He then goes on: "According to a tradition of the Aztec people, the Toltecs in the seventh century of our own era, were the first who introduced into Mexico the cultivation of maize, cotton and pimento. It might happen, however, that these different branches of agriculture existed before the Toltecs, and that this nation, the great civilization of which has been celebrated by the historians, merely extended them successfully. Hermandez informs us that the Otamites even, who were only a wandering and barbarous people, planted maize." Mr. Flint, who has investigated the early writers on this subject very thoroughly, and who inclines strongly to the opinion that it is of American origin, considered it a curious fact that maize is not mentioned by travellers who visited Asia and Africa before the discovery of America. These travellers, who were generally learned men, and were often very minute in their descriptions of the products of the soil, give no account of it until after the discovery of this country. It is true that it was universally cultivated on this continent at the landing of Europeans here. It constituted almost the only food for all the tribes of Mexico, Peru, Brazil, at the Orinoco and the Antilles. It served for money among the Mexicans, and its theft was punishable with death. In 1621 the Massachusetts Indians regaled some of the Pilgrims with bread called *mazium* made of Indian corn; the Five Nations or Iroquois made the planting of corn their business, and the Lenni Lennape (or original people), the grandfathers of other Indians, called maize the native grain. Those who believe with Humboldt that maize is a truly American plant, say it was on the return of Columbus from his first voyage in 1493, that he carried the first grains to Europe, and thence its cultivation spread into Portugal and the south of Europe. The Portugese, who were at that time the great navigators of the world, having previously doubled Cape of Good Hope, and discovered Java in 1495, introduced it along the African coast and into Java, and thence its cultivation spread into India and China, and Indian corn was—as has been stated, correctly figured and described in a Chinese work on agriculture as early as 1552. Now is it not as reasonable to suppose that this plant may have been indigenous to China, and have long been cultivated there, as to suppose that in the comparatively brief space of little more than half a century, it should have been transferred from America to Europe, thence to Java, thence to China, and have been so generally understood and grown by that proverbially slow-moving and secluded people, as to have been figured in a book on the agriculture of the country in so short a time after its introduction? But I am satisfied those who have investigated this matter,—and which, notwithstanding the time I have given to it, is but the merest and most imperfect outline of the same,—must come down to just this conclusion; that maize may have originated in China, and thence a thousand years ago, have been carried to Peru; or it may have originated in South America, and been introduced to Continental Europe by Columbus, and thence carried into China and India by the Portuguese. Or in other words, our conclusion may take the form of a brief summary, something like this:

1st. The dissenting opinions of the botanists during the sixteenth and following centuries, about the origin of maize, do nothing but cast a heavy doubt on the Western or American origin which is attributed to it.

2d. If it were certain, as historians assert, that maize was cultivated in America when Europeans landed here, at the end of the fifteenth century, it would appear equally true that this plant was in full cultivation within India at a date previous to that.

3d. The treatise on Natural History written in China, towards the middle of the sixteenth century, marks the existence of maize in that country, within a time so close to the discovery of America, that this event must not be connected with the introduction of that plant into Asia.

4th. The maize found within a mummy's coffin at Thebes, would be a solitary but precious relic, proving that maize had existed in Africa since the earliest time.

Maize is now found in every quarter of the globe, and it is eaten by a greater number of human beings than any other grain except rice. On this continent it is more or less profitably grown from Southern Chili up the Pacific coast to Oregon, and from Canada down the broad stretch of the Atlantic to the mouth of the Colorado river in latitude 40 degrees south, that being near the northern boundary of Patagonia in South America. It is cultivated, though to a limited extent, in China and Japan, and to a still more limited extent in India. It is a leading crop, second only to wheat and barley in all the provinces of the Ottoman Empire. The same statements may be made of Southern Russia, Hungary, Southern Austria and Portugal. In France it is grown in what is termed the "maize region;" in Germany between Heidelberg and Frankfort, while it is also cultivated in the West Indies and the islands of the Eastern Archipelago. In the British Isles, maize will not mature oftener than once in six or seven years, on account of the cool, moist summers. After extensive observation and inquiry, De Candolle assigns the growth of maize to the following limits: In North America, south of 54 degrees, north latitude; in South America, north of 40 degrees, south latitude; in Europe, south of latitude 54 degrees, north. Still, within this great general area there are sections, more or less extensive, in which, on account of soil, climate, or elevation, maize cannot be grown. Such for example are the dry coast lands in California, and the mountainous elevations of New York, Canada West, Northern Maine, Vermont, Wisconsin and Minnesota. It will not germinate unless the temperature of the soil is at least 48° Fahrenheit; has its most rapid development at 93°, and never germinates when it is above 115°. But when the mean temperature of the period of growth ranges from 60 to 80 degrees, Fahrenheit, maize accomplishes all the phases of its existence in from 60 to 150 days—soil, climate, and the variety cultivated making up for this wide difference in the time required. According to Boussingault, in Alsace in France, 40 degrees north latitude, with a mean temperature of 62° Fahr., maize matured in 153 days, requiring a total of 9.539 degrees of accumulated heat. In Jamaica, in latitude 18 degrees north, the average mean temperature of 71° Fahr. for 122 days, with a total amount of heat of 9.735 degrees, was required for maturing maize. On the elevated plains of the east side of the Andes, in South America, with the low average of 58° Fahr., 183 days, and 10,697 degrees of accumulated heat were required. In Central Illinois, where the mean average temperature for May, June, July and August was 71° Fahr., a total amount of heat of 8.819 degrees was needed to perfect the crop; and in Massachusetts, the average mean temperature for the above named months being 64° Fahr., but 7.856 degrees of heat were obtained. What is true of wheat, is also true of Indian corn, in this particular, that it attains its maximum of production nearer its northern than its southern limit; and, indeed, even in those States where it may sometimes be cut off by extremes of temperature, as in Wisconsin, Northern Illinois, Michigan, Central New York, and Northern New England. Its period of vegetation is shortest where the average mean temperature is the most elevated; it demands from 6,500 to 7,000 degrees for the earlier varieties to fully mature, and it may be accounted a sure crop in almost every portion of the habitable globe, (with the few exceptions named), between the 44th parallels of latitude, north and south. This of course is a broad statement, applicable to the globe; but so far as Maine is concerned, it is true that we grow good corn up to 45° 20′, or along the line running from Flagstaff (Dead River), in the western, to Foxcroft in the central, and Carrol in the eastern parts of the State. Indeed, about Houlton, and even as far north as Presque Isle, 46° 40′, the small eight rowed or Canada variety matures almost every year, the farmers there growing a small amount for their own use, and harvesting at the rate of sixty bushels of shelled corn to the acre, on one-fourth to one-half acre. Assuming that the average time of planting corn in Central Maine is May 22d, and the average time of its maturity September 5th, a period of one hundred and seven days, Prof. M. C. Fernald of the State College, Orono, determines the accumulated heat for this period and locality to be 6.890 degrees. The late Dr. Holmes, in the Report on the Scientific Survey of the State, 1861, page 356, says: "the line which bounds the northern limit of Indian corn maturing in Maine is a very irregular one, as indeed might be expected, coinciding as it does with the isothermal line and not with the line of latitude. Corn can be raised with certainty within a few miles south of Umbagog. It is raised with less certainty on the lake shores, and again with more certainty on the northern side, as the slope sinks down toward the shores of the St. Lawrence. The Penobscot extends into this belt, and hence, while in its lower sections corn is a safe and profitable crop, in its upper section we find it a precarious one; while further east, on the same line of latitude it is again found more certain." In the report of the Vermont State Board of Agriculture for 1875–6, it is stated, page 310, that Dutton corn planted May 10th, ripened August 11th, and produced 47¼ bushels per acre; while the Early Dent, planted the same date, ripened August 5th, and yielded 49½ bushels per acre. This it seems to me is much earlier than the average time of planting in Maine.

Indian corn, readily accepts the modifications of soil and climate, and surpasses all the cereals in the ease and facility with which it settles down to that particular kind of life and growth which the circumstances surrounding it imposes. The exhausted soil and tropical heat of Cuba produces a plant having a stout stalk 12 feet high, and an inch and a half in diameter at the ground, bearing, up as high as a man can reach, one or more tapering ears of flint corn, 6 inches long, 1½ inches in diameter, and containing 16 rows of about twenty kernels. The underdrained and well manured prairie soils of Illinois, produce a stalk 8 or 9 feet high, 1¾ inches in diameter at the ground, and yields an ear, as high up on the stalk as a man's breast, which will measure from 9 to 10 inches in length, 2 to 2½ inches in diameter, weighing when dry, 16 ounces, and containing from 22 to 24 rows, or nearly 1,000 kernels. The flint corn of New York and New England, has a stalk of from 5 to 6 feet high, from which ears from 6 to 11 inches long push from the stalk at from 18 inches to 2 feet from the ground, yielding from 50 to 100 bushels of ears to the acre. All who have observed the growth of corn, have noticed the strong tendency of any variety introduced from abroad, after a few years of cultivation, to assume the form and shape common to the new locality—partly due to cross fertilization, or hybridization, and partly in conformity to the general law that every soil, latitude and situation produces a certain normal development, which is so positive that it cannot be overcome but with great difficulty. If the corn of Cuba was introduced into Illinois, it would rapidly change its form, increase the size of its ear, lessen the strength and height of its stalk, shorten its period of growth, and accommodate itself to the new circumstances. So, on the other hand, if the corn of Illinois was placed in the tropical climate of Cuba, it would speedily settle down in its new home, and in a few years so change as to be scarcely distinguishable from indigenous varieties. But it is true, notwithstanding this peculiarity of corn to change its characteristics to new surroundings, that while northern varieties will generally improve in size and productiveness if carried southward, southern corn, if brought north, will either not mature or soon degenerate. So, too, the varieties of New England, introduced into Illinois, often do well for a year or two, but it does not generally hybridize well with the common corn of the State, as the period of blossoming is earlier or later in the one case or the other, and finally loses its individuality and degenerates. Occasionally, too, Western corn, brought to New England, will in our longest summers, fully mature; but generally, in a few years its distinctive characteristics disappear altogether. There is a variety called Brazilian maize, with ears no longer than one's little finger, with kernels not larger than a mustard seed, while to the other extreme are the giant southern varieties, having a large cob, and kernels fully half an inch long. In one variety, which Bonafous describes as a distinct species, each kernel is enveloped in a miniature husk like a delicate wrapper, and while this variety is by some considered the primitive type, the kernels lose their husky envelopes by cultivation; neither has this nor any other form of maize ever been found in the wild state.

Of course, this flexibility in the character of maize, this ease with which it adapts itself to circumstances and location, causes almost innumerable varieties, which are occasioned by the differences of soil, climate, selection of seed, modes of culture, &c. M. Bonafous mentions one hundred and twenty varieties, as belonging to Spain; and Mr. Klippart describes sixty-nine as being cultivated in the State of Ohio. Mr. Enfield, in his general work on Indian corn,—which, though somewhat hastily prepared and rather unsatisfactory, contains much important information,—describes ten varieties of yellow corn, eight of white, and ten of sweet.

Varieties differ from each other in color; number of rows on the cob; form and size of the kernels; hardness and chemical composition of the grain; time of maturity; resistance to cold, drouth and wet; weight of the grain; tendency to keep, and their value as fodder. The most distinct of these, are the white flint, yellow flint, gourd seed, Guinea or pop-corn, and the sugar or sweet corn. The gourd seed is the variety largely grown throughout the South, and is very prolific; while the splendid yellow corn of New England is the most nutritious. Indeed, there is but one sort known more nutritious than our yellow corn, that is the corn of New South Wales, which is superior in this respect to any variety known, but is of little commercial value, being produced 14,000 miles away from food centres. There are also varieties that are red, blue and purple; but they are only regarded as novelties, and are never cultivated as a field crop. Concerning the sorts grown in our own State, it only needs to be said, in general, that we should aim to grow those varieties which have a small cob, good depth of kernel, mature rapidly, and thus accomodate themselves to our short summers. Such are somewhat dwarfish in their habit of growth, generally productive, and only occupy the ground for three or four months—some even less than one hundred days. The New England eight-rowed, Canada yellow, and Dutton are esteemed varieties in this State.

Considering the flexible nature of Indian corn, the ease with which it is managed, and the readiness with which it assumes to itself new characteristics, desired by the cultivator, it is strange that more attempts have not been made by our farmers at improving the varieties they now have, or of producing new ones better adapted to our needs. In this State, the desideratum is to increase the early maturity of a variety, without diminishing its productiveness. And if farmers realized how much could be accomplished in this direction by hybridizing, or a mixture of selected varieties; or even by great carefulness in selecting the seed of the variety cultivated, obtaining the earliest ears, and ears from stalks producing the largest number of ears—great results towards the desired end could be reached by a few years' persistent effort. But in this matter, as in a good many others, farmers are not unlike some other people, who often get indifferent and drift along in the old ways without inquiring for anything better. It is true, however, that the two simple matters of selection and culture, will do wonders in a few years towards a permanent improvement of the varieties grown. By applying the same principle of selection to seeds, which our best breeders follow in the mating of their animals, results equally as desirable may be gained. By this means Mr. Hallett of England, doubled the size of heads of wheat; and Mr. Baden of Maryland, established a variety of corn which gave him, uniformly, from five to seven, and frequently ten ears to a single stalk. If a farmer is curious to extend his experiments in this direction, hydridizing offers the surest mode of reaching the highest results. It would of course take a longer time, but it is a subject full of interest, and is so easy of accomplishment any farmer may succeed in it. First, decide what precise traits or properties you wish the new variety to possess, then obtain sorts well adapted to the climate, and such as produce its tassels and silk fibres simultaneously, giving the varieties while growing the best opportunity for development—good soil and good culture. From these varieties propagate the intended sort from the most perfect types obtained, and by continued selection of the best ears from the newly obtained sort, go on in the same line of improvement until the variety is well established. It would not be easy to foretell the extraordinary results that could be reached in thus improving and multiplying the varieties of corn, through the united agencies of careful selection, judicious crossing, and thorough cultivation; and whoever will apply to this subject the needed care, judgment, skill and patience, will find abundant reward in the production of a quality of maize superior for his own locality to any yet known. And this compensation is open to any farmer who will engage in the work necessary to reach it.

I can hardly enter upon a statement of the chemical history of the plant without trespassing upon that division of the subject assigned to a gentleman who is to close this discussion; still, without a brief glance at it, my part would certainly be incomplete.

An analysis of maize shows it to be admirably adapted to sustain life, and to furnish materials for the growth of both human beings and domestic animals. Indeed there is hardly any other grain which yields so much for the support of animal life. It contains 10 per cent. of albuminoids or flesh forming materials; 68 per cent. of carbo-hydrates—starch, sugar, &c.; 7 per cent. of fat, and from 1 to 2 per cent. of ash or mineral matters. The large amount of oil or fatty matter is noticeable, varying with the kind of corn, from 6 to 11 per cent.; the hard flinty varieties or northern localities having the most, and the starchy varieties the least. Wheat contains but 1½ per cent. of fatty matter; and as compared with wheat for human food, 138 pounds of corn would be equivalent to 100 pounds of wheat. Corn is a highly concentrated nutriment, and is capable of serving as it does in some tropical countries, as almost the sole food of the population. The cob, though but slightly nutritive, contains some materials which aid in the formation of flesh and bone; and the grinding of the entire ear as a food for cattle, is to be recommended. A more minute analysis is as follows; (authority of Dr. Playfair, Kensington Museum, London):

Water,	14.0
Gluten,	12.0
Starch,	60.0
Sugar, Gum,	0.3
Fat,	7.7
Woody fibre,	5.0
Mineral matter,	1.0

Or

Water,	14.0
Flesh and force producers,	12.0
Force producers,	73.0
Mineral matter,	1.0

On the authority of Dr. Sturtevant of Massachusetts, a bushel of grain, with its corresponding cob and stalks (stover) would remove from the soil on an average, as follows:

	Grain, lbs.	Cob, lbs.	Stover, lbs.	Total.
Nitrogen,	.89	?	.38	1.27
Phosphoric acid,	.31	.02	.30	.63
Potash,	.18	.03	1.33	1.54

Now if this table represents the actual exhaustion of the soil by the removal of a crop of corn, the question comes up, why will not the application of these amounts of these constituents on any land favored by temperature and moisture, produce a bushel of grain? But the answer comes, and it comes only after the results of repeated and careful experiments have been noted:—It is an easy matter to supply the chemical elements found in our crops, to the *soil*, but not so easy a matter to supply them to the *plants* we are growing. So much depends upon the variety of seed, the peculiarities of the season, the influences of other surrounding circumstances and modifying influences known and unknown, that it is impossible to prophesy the amount of grain of a certain kind which a given quantity of chemicals may grow. If this were possible, the agricultural millenium would be here, and the agricultural millenium is a good ways off. To accomplish it there would positively have to be no variation in soils; no difference in varieties; an unvarying and unchanging round of season, temperature and all climatic conditions; chemical manures of undoubted purity, and man so perfect as to make no mistakes. Until these conditions are reached, we must do the best we can with finely pulverized soil, the best selection of seed, good cultivation, and plenty of fine, old, well decomposed, barnyard manure. All these properly mixed with strong arms and willing hearts, will bring results so far above disappointment, that the farmer need have no cause for complaint. Still, efforts in the other direction are both honorable and to be encouraged; and no one, perhaps, in our country, has done more to bring practical formulæ of this nature to the assistance of practical men, than Prof. Stockbridge of the Massachusetts Agricultural College, whose name has been brought quite prominently before the farmers of the country in this connection, during the past two or three years. His experiments have led him to promulgate a formulæ for the production of fifty bushels of the grain of corn, and its natural production of stalks to the acre, more than the natural yield of the soil, as follows:

Nitrogen,	64 lbs.	In the form of	Sulp. ammonia,	24 pr. ct.	dry salt	320 lbs.
Potash,	77 lbs.		Muriate potash.	80 "	" "	154 "
Phosphoric acid,	31 lbs.		Superphosphate,	13 "	sol. acid	248 "

His formulæs have been pretty generally experimented with by the farmers of New England, and while it is believed he has struck the key note to much practical truth, it must also be said that in many instances the results have been such as to make the trials very unsatisfactory.

You will be glad, I know, that I have but one other point to mention; that a dry and uninteresting one, which I have reserved for the last, and which can be disposed of in few words. I refer to statistics;—and if at the first we were bewildered with the labyrinth of conflicting facts and opinions regarding the origin of this plant: at the last we are certainly bewildered by the array of figures which indicate the wide extent of its culture throughout our country, and the vast quantities produced, consumed, and exported.

Before the American Revolution, maize had not only become an important staple crop of home consumption, but was also largely exported; Virginia alone, in a single year often sending abroad 600,000 bushels. The immense and rapid increase in its production dates back, however, only forty years, and is largely due to the gradual extension of settlements westward, and the development of means of transportation. In 1840, corn first appeared in the returns of the National Census, with 377,531,875 bushels; in 1850 it had reached 592,071,104 bushels; occupying 31,000,000 acres of land, and yielding a value of $296,034,552. This was a gain in ten years of 57 per cent., while the increase of population during the same period was but 35 per cent. At that date it formed three-sixteenths of the whole agricultural production of the country, occupied more than three-tenths of the improved land, and amounted to more than 25½ bushels to each inhabitant. In 1860, it had reached the enormous production of 838,792,742 bushels; its highest annual yield—as it had fallen to 760,944,549 bushels in 1870; due largely to the increased production of wheat and the occupation of the land with this crop. Of this amount eighteen States produced over 14,000,000 of bushels each; Illinois occupying the grand position of yielding 129,921,395 bushels in a single year. The exports of corn from the United States, chiefly to Great Britain, for the year 1873 alone, amounted to 38,541,930 bushels, valued at $23,794,694; besides 403,111 bushels of corn meal valued at $1,474,827: being equal in amount to the entire quantity exported by the United States for a period of twenty-three years, from 1825.

Our own State does not make a large showing in this magnificent schedule, the last census giving us credit for only 1,089,888 bushels, or about 2½ bushels to each inhabitant. Oxford county leads off in this list with 181,319 bushels; the second rank being taken by York, with 175,924 bushels, and the third by Cumberland, with 154,360; while Washington takes the lowest place, with only 953 bushels. Aroostook, which is generally set down as a county that does not produce any corn worth speaking of, added to the above total the very respectable amount of 4,242 bushels. With the most favorable conditions for growing this crop in its greatest excellence; with a record showing that our average production per acre is 33 bushels—a yield of but ten bushels per acre less than that of the great corn producing States of Illinois, Iowa, Indiana, Missouri, Kentucky and Ohio;—it is a fact which shows heavily against us, that we only produce 2½ bushels to each inhabitant, or that our 56,941 farmers grow but nineteen bushels each. By just doubling this amount in 1877, we shall produce 1,179,776 bushels, and save to our State in this item alone, more than $600,000 which now goes out of it only by many hard knocks, to purchase western corn. I appeal to you if it is not time we made a strong effort to become more independent of corn cribs three thousand miles away?

A word may be said of the specimens of corn here presented. I wanted to have made a collection which should have embraced varieties from every county in the State, and thus have been somewhat representative and educational in character. But I failed to get specimens from some sections, and am sorry to say that in cases where samples were done up in paper and transmitted by mail they were badly damaged, and in a few instances—which is an unwelcome confession—the rats in my office went through some such packages, which came by express, and got their part, before I had time to arrange the collection. Still, all who responded to my call for samples are entitled to thanks, and myself to censure for not providing strychnine and rat traps. But while the collection is only a fragment, it is not without interest, and I am sure will impress all farmers with the exceeding value which attaches to collections of natural objects of an economic nature. I can think of no one thing more likely to interest the intelligent young farmer, than the making of a collection of grains, seeds, soils, insects, grasses, plants, woods, &c., to be found in his own locality. Such a collection would add an interest to his business and his home; while I am sure this work should be undertaken by every farmers' club and agricultural society in the State, and a perpetual museum of such things be established in connection with their exhibitions and meetings.

I should like to give you a picture of the value and importance of this grand crop, this princely grain, this king of the cereals: of its surpassing beauty in its early growth, waving in the clear air of a July morning, or rich with its heavy fruitage when ripe for the sickle, in the bland, mild days of early autumn; of its vast use as food by a larger number of the human family than consumes any other single grain, except rice; of its importance in the economy of the food supply of the nations, which renders it next to wheat, a better standard of value than even gold itself; of the hope it gives to the heart of the farmer as he looks at a crib full of its golden, life-giving ears—but I have not the time nor the ability, and if I had you would not care to hear me. During recent years I have many times been invited to visit the farms and homes of farmers, who had something nice upon which the pride of their heart was set, and which they have wanted to show me. Generally, it has been a neat stable, with its first-class and always costly fixtures and appointments; its horse wardrobe and furniture of the best make; a good stepper or two, nicely bedded down in box stalls, and half a dozen prospectively fast colts in a luxurious play-yard. This is well enough in its way, for those who have plenty of money, but costly and exhaustive in the end, and not at all adapted to farmers generally. When the system changes, and instead of a large excess of this kind of stock the farmers of Maine take pride in their flocks of sheep and dairy cows; when they show with real satisfaction their bins of wheat and cribs of corn, things which bring to wife and children the positive assurance of daily bread, and to the farmer himself a wallet in which he can manage to keep a few pieces of Uncle Sam's currency that he is not obliged to pay out for flour and corn—then will greater comfort and happiness come to our people, and our State will have entered upon a new term of prosperity and independence.

II. Preparation of the Soil and Fertilizers.

By B. M. Hight, Skowhegan.

The legitimate object of Agriculture is the conversion of inorganic substances into animal tissues; and no animal of importance lives who does not receive a large proportion of his food directly or indirectly from the vegetable kingdom. The way in which nature seems to accomplish her work, is to produce a germ endowed with life and supply it with properties or facilities for reaching a suitable place to grow. For this purpose some are provided with wings, by which they find their appropriate soil, as the seed of the thistle and maple; others are enveloped by a pulp to induce animals to swallow them and carry them where they could otherwise never go, as the apple, cherry, &c. In this manner it is obvious that the chances are very largely against the germ ever reaching a proper soil in a sound condition.

It is believed, that since the Creation no substance has been added to or taken from our earth and atmosphere. The transformation of inorganic elements, to vegetables and animal tissue, is but one side of the great circle of life existence—the other of which consists in death and decay: the continuance of either half of the circle being absolutely necessary to the existence of the other. The inorganic would supply the successful vegetable germ with food upon which it grows and comes to maturity; the mature plant then dies, decays and is resolved into its original elements to resume their places in the inorganic world, ready to again assume the vegetable form when summoned by the living germ. The introduction of animal life into this circle, serves to increase its activity by facilitating the resolution of the mature plant to its inorganic element.

The profoundly mysterious principle which we call vitality, which enables the germ to select from surrounding elements its proper elements of nutrition, and to appropriate them to its growth, and which is furnished by Him only who breathes into the nostrils of man the breath of life, sustains about the same relation to the activity of this circle which the heart in animals sustain to the circulation of the blood. The activity of this circle in no sense depends upon the efforts of man, for it has been in active operation ever since the creation, and it is believed that it will continue until the end of time. But as nature is no respecter of persons, and bestows her aid upon one plant as readily as another, and as all plants are not available to supply the wants of man, it is for his interest to introduce into this circle a large proportion of such as are, and this is the province of agriculture.

Suppose it seems desirable to our farmers to secure a crop of Indian corn; the first thing to be attended to is the selection of a suitable soil. This, among the farmers of our State, who for the most part I apprehend select their ground and cultivate their soil quite as much with a view to future crops (grain or grass) as with a wish to secure a maximum crop of corn, is a matter of secondary consideration; in other words, instead of selecting a soil for the crop, they select the crop for the soil, and that because the cultivation of the soil adapted to secure a crop of corn is the best preparation of that soil for future crops. But supposing we are after the present crop only? To guard against cold, we secure a spot protected from northerly winds. The soil should be that best adapted to "draw the sun." This indication will not be answered, very evidently, by clay or wet land, but as rocks are, other things being equal, well adapted to this purpose, we will have some modification of sand, which is only pulverized rock. Our soil should be porous, to allow moisture and gasses to ascend from below and admit of absorption from above; our subsoil should not be loose gravel, lest the heavier compartments of our fertilizers soak down to a hard pan, unite with water and run away, if on inclining grounds, to our neighbor's land, or get so low that it shall not return in season to benefit the present crop. We would not object to gray clay, or slate ledge, with soil enough above to indemnify against ordinary drouth. The soil proper should be of the finest sand (which is rich in silex) reddened somewhat with iron, darkened with decayed organic matter, and all so proportioned and mixed as to constitute what has been called a cling-soil of sandy loam. Such a soil is too adhesive and heavy to blow away, and too porous to bake at the surface after being wet. To prepare the soil I would commence in the season before planting, by plowing in from six to eight inches deep a heavy crop of clover or coat of vegetable dressing. This I would do early enough in the season to allow decomposition of the vegetable coat to fairly commence; then I would spread broadcast my barn dressing—(and I will say in parenthesis, I believe that two loads applied in the fall is worth three in the spring). I would then commence the work of pulverizing and mixing my soil down to the vegetable dressing. And here allow me to explain what I mean by pulverizing and mixing:—My ideal of pulverizing and mixing would be realized by placing soil and fertilizers in a painter's mill, and grinding them together as he would paints of contrasting colors, until they should blend in one perfect color. But, as most farmers have not the conveniences to use a painter's mill, I would have them come to the point nearest to that which is practicable, and that is a Randal pulverizer, a most useful farm implement. Imperfectly pulverized and mixed soil and manure are as unsucessful in securing a good crop as a surface covered with badly ground and mixed paint is in pleasing the eye. Here will be a lump of manure that nothing but a witch-grass root can penetrate, and our delicate corn rootlets must be content to suck up what little they can get of nourishment on the surface, and leave the lumps after the crop is matured to waste their usefulness on the autumn air, there being no roots in the soil to be nourished by its decomposition. Every lump of soil is so much land laying waste, and in many corn fields they constitute a proportion of the soil, larger than can be afforded, to say the least.

It may be objected to the practice of raising a clover crop to turn in, that it is just returning to the soil what it took to grow it, and nothing is gained for your pains. But such objectors do not bear in mind that the plant in its growth receives much from the atmosphere which is thus conveyed to the soil. The soil being properly prepared and manured needs no dressing in the hill, and hence no holeing, a scratch to indicate where the corn is to be dropped is sufficient.

Now, a few words concerning the fertilizers to be selected. It is impossible, I believe, to take a matured stalk of corn and by an exact chemical analysis ascertaining the ingredients of which it is composed, and thence to deduce what are the exact elements required to grow and mature another stalk like it. This experiment does not even approximately show us what inorganic elements have been used simply to maintain its vitality and then discharged from the plant; any more than an accurate knowledge of all the elements with their exact proportions in an adult animal will give you the quantity and kind of feed it took to grow the animal.

I am inclined to make two principal classes of fertilizers, viz: stimulant and nutrient. To give my opinion of the operations of the first class or stimulant fertilizer, let us suppose that my soil is prepared for a good crop of corn, that it contains all the elements for producing such a crop, and in proper proportions, and that when the crop is matured there will remain a fair amount of the elements in reserve, as will be the case when the soil produces its crop easily, if I may be allowed the expression; but I am anxious for an extra crop, so I obtain from the chemist's laboratory a supply of all the principal elements for the growth of corn, and apply this to my soil. This stimulates my plants to an extra growth, but in order to retain the proper proportion of the elements in the plant it must draw from the soil what should be held in reserve of those elements which I failed to get at the laboratory, and my soil is in a much worse condition than it was before using the stimulant fertilzer; for by unduly stimulating the soil they directly tend to exhaust it; so that after a few years of extra spasmodic activity, the soil will gradually refuse to respond at all. Stable or animal manure, being more moderate and even in its action, and withal a natural product instead of an artificial compound, will never exhaust the land. If the soil and the human system are affected alike by the use of stimulants,—and there is no good reason that we know of why they should not be analogous in this respect—then the doctrine is undoubtedly correct. Every farmer who has had experience, knows that the use of artificial stimulants of whatever kind, never yet really proved a lasting benefit to nature in any form. They spur nature up to do more than she naturally would do but for the stimulants; but every particle of extra strength thus put forth is subtracted from the original stock which she has on hand. Now it will not require a very brilliant mathematician to see that this process carried on for a series of years will surely use up all the original stock on hand. Am I now advised that I should submit my soil to chemical analysis and supply this want? But my learned friend, I have neither the facilities or the education requisite to analyze my soil. I well know that if I should send you a quart of my soil, you would for a consideration give me an analysis; but even then that quart of soil would be about as likely to represent my whole field as a mad Congressman would to represent his constituency.

By nutrient fertilizers, I would be understood as meaning those ingredients, from whatever source derived, which furnish to the soil all the elements which the soil is expected to furnish for the growth and maturity of the desired crop. That this class of fertilizers cannot be found in decomposed animal matter I am quite well persuaded. I have been informed, that many years since the catch of alewives in Taunton, Mass., was so great that they were used for enriching the soil. This was done by placing one fish in each hill. The result was wonderful Enormous crops were raised,—but in a few years the soil failed them, and it was with the greatest difficulty that it could be reclaimed. Now, it can hardly be said that all that animal compost can do was not secured in this case, for the fish decaying in the soil must have imparted to the soil their whole force.

In the solid and liquid excrements of farm animals we have nearly all of the vegetable matter they have consumed over and above what they have assimilated or converted to the formation of the various tissues of which their bodies are composed, in addition to the effete matter resulting from the constant wearing out of those tissues, which are simply a modification of the assimilated portions of the eaten vegetables. I would have my stock of animals well fed, and not over-worked; their feed should draw liberally from the grainery, especially from the corn crib. I would place all the refuse products of my last year's corn, and all cereal crops, where it would be mixed with all the excrements (fluid as well as solid) of my animals. If this refuse is not sufficient to absorb and hold all the liquids from my stable, I would supply the deficiency with other vegetable matter, the preference being given to those most nearly resembling corn in their composition. While this mass is undergoing the process of decomposition, I would—if my soil is disposed to the growth of sour, cold vegetation, as sorrel, ferns, or moss—use liberally of wood ashes, and keep the whole constantly stirred, (and for that purpose as good a machine as I am acquainted with is to be found in the swine's snout), until the whole is perfectly rotted and thoroughly mixed. And I ask no better fertllizer than this thoroughly mixed with my soil, for the soil must be made mellow and porous by deep and searching process of pulverizing, often repeated. For we all know, that nearly all the large crops we have any account of have been produced to a large extent by thorough tillage. It cannot, then, be too frequently or forcibly suggested to the agriculturist of Maine, that the more he contributes to break up, crush, grind and subdivide the particles of the soil, before planting, so much more does he co-operate with nature, and assist her generous efforts to return him a liberal yield.

In thus dwelling, with some repetition, upon what is deemed an important subject, we may perhaps weary the patience or provoke the severity of some critical reader; yet such is the consequence of this principle, and such the extent of its influence, that if we could thereby impress it more effectually on the minds of our cultivators, I would not hesitate to employ yet a dozen more terms to express the same ideas, did I have the ability to find language to convey them; for there is no reason to doubt that if a more thorough system of tillage were practiced by every one of our four million farmers, it would add to the corn crop of this country in a single season thousands of bushels of corn, and leave the soil in good condition for that most useful and most valuable production of the vegetable kingdom—grass.

DISCUSSION.

Mr. **CHASE** of Carmel. I consider corn the most profitable crop I can raise. I have raised it for thirty-five years, and have never failed of getting a crop. I can raise it for fifty cents per bushel. I generally plant about one acre. I have a small farm and do my work by my own hands mostly. About twenty years ago, when I farmed in a different part of the town from what I do now, I had a small piece, and got about 100 bushels of shelled corn per acre, as near as I could measure. Awhile after that, I had a piece which contained about an acre. It was measured by uninterested parties, and the yield was 90 bushels of shelled corn to the acre. About twelve years ago I raised, by measure, on one acre, 91 bushels and some quarts of shelled corn. Since that I have not measured my corn, but I can make a very fair estimate by seeing it in the chamber that I have measured it out of. This last year the violent wind which we had in the month of July injured my corn more than I ever had corn injured before by the wind. The drought also injured it somewhat, yet I harvested from 150 rods of land 160 bushels of ears of corn. You may say that I have told some pretty large stories, but I am prepared to say, that one hundred bushels of shelled corn can be raised to the acre, with good manuring. I have raised ears of corn 13½ inches long; and I have, I don't know how many bushels of corn at home, as good as this which I have exhibited here. Now you want to know how I do it.

You readily understand that we cannot all farm alike. All soils are not alike, and it needs judgment to tell what soil is best adapted to produce corn. Now, to begin at the starting point, I have a good barn cellar which saves all the liquid manure, which I consider to be worth more than the solid. I use little new manure in the spring. In the fall I select my piece, which is generally where I have raised potatoes. My soil is what would be called a gravelly loam—light and dry. After I have harvested my potatoes, I haul out my manure, leave it in heaps, and at the proper time I spread it evenly. I don't measure it, but put on what I suppose will produce a good crop of corn. Then I put in the plow with oxen and horse, and turn it over about seven inches deep. I plow immediately after I get my dressing spread. In this way the manure is well taken care of, and I do it at my leizure. In the spring I make an examination, and if the cultivator going over it will make it light, I use the cultivator, if not, I take a small one-horse plow, and harrow it down well, and then my ground is ready to plant. I put no barnyard dressing in the hill, as farmers generally do. I have planted as early as the 29th of April, and had it do well. This year it was the middle of May before I got ready to plant. I take such materials as I can collect about the buildings—hen manure, ashes, leached or dry, as the case may be, anything of that kind, then I mix them with well rolled sawdust or chip dirt, or loam or muck, putting them layer upon layer, and pile it up as high as I can. In about four days it will be warm; then take a spade and spade it over into another place; let it lay about three days and then pitch it over again, and it is ready for use. This I take in a wheelbarrow, and put on the piece, making marks with a hoe to indicate where I want the corn dropped. I put in from half a pound to a pound of this fertilizer in a place. A man will lay out in this way an acre a day without much trouble. In making this fertilizer, I have to use judgment; if I put in too much ashes it may turn the corn yellow. When I drop I put my foot in the earth to make a place for the corn, and cover it from half an inch to an inch deep. I generally plant it about three feet apart each way. I think I used this year from seven to eight cords of well rotted manure. Besides my corn, I raised eight loads of nice pumpkins—my cart holds about fifty bushels of potatoes.

This is my way of raising corn. If I were going to try and see how much corn I could raise on an acre, I would plant three kernels of corn within 18 inches of each other all over the piece. I tried an experiment one year, making two trenches within a foot of each other; then left a space of three feet, then another double row, and so over the piece. Then I planted three kernels saw-teeth fashion, 18 inches apart, in these rows. It grew very stout, and was the corn from which I got 90 bushels to the acre. The hens scratched over a a small piece of it, and where they scratched it was left thin enough, but I didn't see that the corn was any better on that part of it. I plant no beans with corn, and where I plant so close, no pumpkins. I would always run my rows north and south, because you get more sun than you do when they run east and west. I never hill my corn—have the ground as level when I harvest as when I plant. You know that the leaf of corn is a sort of spout; suppose we have a dry season, with occasional showers, then the rain runs down those leaves to the roots of the corn; and as I have no manure in the hills to dry up, the corn gets the full benefit of it. If I had a lot of dry manure in the hill it would take a good deal of water to wet through that and do the corn any good. In haying time all I do, is simply to keep the weeds down. When the corn gets up, you will find the roots running a foot and a half each way. I have been very careful in selecting seed in the field—taking the largest, nicest, and earliest ears, from the smallest stalks. I have been at work on this seed for the last twenty-five years. My seed was originally the Dutton corn. That is earlier and will produce more than the larger varieties. It had short ears when I began with it, but by constant selection and improvement they now measure twelve and thirteen inches. I cut the top stalks off, and think they will pay for the labor of raising the corn, giving the fodder its relative value with hay, which I think about $10.00 per ton. I cut the stalks, bundle them, carry the bundles on the grass land, and let them stay two or three days if the weather is good. I have poles in the barn where I can straddle these bundles, and they will keep green. I let my corn stand until it is what I call ripe, but I don't let it get too dry. If corn fodder is musty, cattle will have nothing to do with it. I don't believe in selling hay and buying corn. I produce what I raise, and don't buy fertilizers to do it with. I ask no favors, and if the Good Master gives me good seasons I can earn my living from my farm.

Mr. PATTEN of Newport, who had on exhibition a fine trace of eight rowed corn with somewhat shorter ears than that shown by Mr. Chase, but very uniform in size and of excellent quality, being called, responded:

I beg leave to differ somewhat from Mr. Chase's theory. I acknowledge that he raises very good corn, but I claim that I can raise good corn too, and this which I have here is a sample of what I raise every year. My method is this: I plow my ground in the fall, and after plowing haul on my manure and leave it in heaps. In the spring I spread it over as much ground as I think is necessary to get a good fair coat of dressing. Then I plow and harrow two or three times, until I get the ground suitable to work. Then I mark the ground with a potato marker, which marks three rows the first time and two after that. I plant four feet in the rows and three feet in the hills. I am under the necessity of buying fertilizers. I buy the Cumberland superphosphate, which I think is the best in the market, and if we are to patronize such institutions it is best to patronize those in the State. I put about a barrel of superphosphate to the acre in the hill, and cover about 1½ inches deep. As soon as the corn comes up, I want to put in the horse and cultivator, and I don't care how much I go over it from that time till the time of the second hoeing, if it is every day. I hill up a little, and keep the weeds down between the rows till after haying. In this way I can raise good corn and do it every year. I regard it as a profitable crop, and am surprised that so little of it is raised.

In answer to questions: I have used superphosphate some three or four years. I think it does not injure the ground in the least. I put no other dressing than the superphosphate in the hill. I raised this year some fifty bushels of shelled corn to the acre. I cover over the phosphate perhaps half an inch before planting, so that it shall not come in contact with the seed. I plant on old ground. I consider that it makes no difference whether it is after potatoes or corn. I leave the manure in heaps, because it is easier than it is to shovel it out; perhaps it would be just as well to spread it from the cart in the fall.

III. Planting, Culture and Harvesting.

By I. E. Mallett, Topsham.

It does not seem to be a great job to raise a crop of corn, after the ground has been thoroughly and completely prepared to receive the seed; but let us consider the subject for a moment: First, there is the kind and quality of seed, the proper time for planting, with the processes; then its culture at the various stages of growth, and then the securing of the crop in the best possible way or manner to have both corn and stover of the greatest value. I am glad that my friend who has preceded me, has not prepared any except suitable soil for the planting of corn; for I am one who believes to some extent, at least, in the eternal fitness of things, and therefore I would not plant corn in a soil not intended by nature for the successful growing of this crop. The planting of corn in soil not adapted naturally to the growing of corn, reminds me of an anecdote I once read somewhere of a fellow who wanted to borrow a shilling to get him through Sunday with, and upon being asked if a sixpense would do, replied, "Well, perhaps I could get along with it, but then, what kind of a Sunday would it be?" So with corn on soil not adapted to its growth, it might produce *some* corn, but what kind of corn would it be?

I am unable to say which kind or kinds of corn will succeed best in the different localities in this State, but I do not believe in a very large variety for general cultivation. Although there may be some seasons that may be sufficiently long and warm for the larger varieties to grow and ripen, yet I think it to be the wiser course to accept and cultivate a smaller and earlier variety, one that will be pretty sure to mature sufficiently before the frosts of early autumn. I find there are some hundred or more distinct varieties of corn raised, but I believe the small and large eight rowed, and the Dutton, so called, are the varieties most extensively cultivated in this State. I am aware that nearly all, if not quite, have their preferences as to variety grown within their knowledge, and I presume that different localities, different kinds of soil, and perhaps of manures existing or being used, may produce these differences in preference. As it is an established fact, I believe, that different varieties of corn give different results when analyzed by the chemist, it is proper to conclude that different varieties will succeed better in different localities and under different treatment, at least so far as the soil and manures may affect the crop. Indian corn is very flexible in its nature, and readily accommodates itself to surrounding circumstances, (no courtier or politician being more so) but while it equals them in general flexibility, it possesses some fixed principles which are immutable under any and all circumstances.

My idea of the proper time to plant corn is very much like that of the aborigines of this country, which was (as probably all of you are aware) when the leaves of the birch have attained the size of a mouse's ear. I think a great mistake is made by many in planting too early in spring before the heavy rains and cold nights have passed, and any rule that may be adopted to govern as to time of planting that nature furnishes, although it may not be infallible, yet it will be as sure to give success, if followed, as any that we can adopt. Some people are so superstitious that they will plant corn only when the moon is growing. There may be something in that superstition, but I would not wait a great while, or plant a week too early, merely for the sake of planting on the moon's increase. It is said that corn requires a higher temperature of the soil than rye, wheat or grass, or in fact most other crops; and when the soil is warm and sufficiently dry, I should advise to plant corn, using for the purpose, one of the most approved corn droppers, putting four or five kernels in a hill. I think that four stalks are enough to remain in a hill, but the worms generally want at least one in each hill on the average, therefore it is well to put in one kernel for them, and if they see fit, from their great considerateness to leave them untouched, I would take out the surplus stalk or stalks when hoeing. In an ordinary corn soil, I would cover the corn from one to one and one-half inches deep, although I was once told by as successful a corn grower as ever lived in Sagadahoc county, that he never wanted more than one-half inch of soil over his corn at planting. I presume it is the nature and locality of the soil that should govern in this respect.

As soon as the blades of corn are up sufficiently to mark plainly the rows, I would introduce my cultivator, (a good one) and if the weeds or witch-grass have started considerably, I would go through or over it at least twice, and each way at that, being sure to throw but very little soil about the stalks or blades of corn. When the corn is about four inches high, or perhaps a little sooner, I would go for it again with my cultivator, and after stirring the soil thoroughly with this implement, take the hand hoes and go over after it again, stirring any soil or removing any weeds that the cultivator might have missed, and also if there should be too many stalks in any hills, take out the unnecessary ones. I would endeavor, yes, persist, in keeping the soil free from weeds, until the corn is large enough to take care of itself. I believe if I had a good corn soil that I should glory in trying to raise a good lot of nice corn, and a small crop of weeds.

Different varieties require different periods of time in which to grow to full maturity. While some will ripen in sixty days from planting, others may require two hundred days to mature, those common with us requiring, I believe, from ninety to one hundred and fifty days in which to mature; and as our seasons are flanked by frosts at each end, it becomes us to strive to force and coax our corn along as fast as possible.

Now, then, if we have a field of corn ready for harvesting, or the indications are such that we expect a frost very soon, the question arises, How shall we harvest it in order to secure the best result in regard to fodder as well as corn? I am aware that we all have our own notions as to the best way to proceed in harvesting this crop, but I believe that the course generally pursued by the farmers of Maine, is to cut up at the ground and stook it, which course I would certainly recommend as the better one to pursue generally, although the method of cutting the top stalks has its merits. I believe if the frost does not come before the corn begins to turn or ripen, and you have a sufficiency of fodder so as not to need the butts (as we term them) for fodder, the corn will be heavier than to cut it up at the ground, at the time of cutting the top stalks. But it becomes us to make the most of our *time* as well as of our fodder, and if we have an eye to these, I think we would choose the method of cutting our corn at the ground the *first time*, at or near the time the kernels begin to glaze, or the husks begin to loosen about the ears.

I am sure I need not occupy your time in arguing the point, that it is less labor to cut the corn at the ground than to cut the top stalks, and it will require but little more time to stook the corn and fodder than it will to stook the top stalks; and my course would be this: When I cut up the corn I would lay it in bunches of about six hills each, binding these bunches into bundles with stalks of corn or other material; then take my stooking-horse (as we term it), going between two rows of bundles, putting from eight to twelve bundles in a stook, being careful to place the bundles out sufficiently at the bottom to have the stooks so braced on all sides as to be able to withstand the winds of autumn; then bind these bundles securely at or near the top, with a good stock of corn or a withe. Some use for this purpose rope-yarns, which are perhaps as good as anything, if easily procured. When this is accomplished, the corn may remain in the field until we wish to husk it. Then take the team and go for it, and by taking off the band from the stook we have bundles of convenient size to handle easily with a pitchfork, if we wish to handle it in this way, or take it in the hands and place it upon the cart; unload it carefully, standing it up in the barn floor. My manner of husking would be this: Lay a bundle on the floor, breaking the ears from the stalks, keeping the stalks relieved of the ears of corn separate from the others, throwing the ears in a pile to be husked after disposing of the stalks, which we can place in any part of the barn we may wish, for convenience. I would have a good corn barn, expressly for the curing of my corn, made in such a manner as to give the air a good and free circulation through it; and after husking the corn, leaving three or four good husks upon a plenty of the best for seed for myself and some of my neighbors, I would husk cleanly the residue, putting all of the soundest in a crib, of from two to three feet in width, along the sides of my corn barn; where I have no doubt it will dry nicely. And within one month's time I would have one of the nicest old-fashioned Indian puddings (such as my old sainted mother used to make), and a loaf of the old-fashioned, *brick oven* brown bread! Why, my mouth waters, even now, at the thought of such luxuries! I sincerely hope that we as farmers of Maine, may give the corn crop more attention in the future than we have done in the past, and not be obliged to get our corn, or so much as we do now, from the West, which is quite inferior in quality to Maine grown corn.

I did not expect to advance any new ideas in regard to the raising of this most excellent crop,—as I think, the *most valuable* of hoed crops; but, if by the reiteration of some of the different modes of cultivation, &c., one individual may be aroused to new and increased energy in the cultivation of this important cereal, I shall feel well repaid for my efforts in this direction.

IV. Uses and Value of the Crop.

By Lyman H. Winslow, Nobleboro'.

To the mind of every intelligent inquirer into the various agricultural products of this country, is presented the fact that the people of the entire continent bear uniform testimony in favor of the palatableness, the healthfulness, and the economy of Indian corn as a food crop. That corn possesses all the advantages we here claim for it, is proved, not only by the universality of its consumption, but by a comparison of its nutritive properties, as ascertained by chemical analyses, with those of other grains from which bread is made. The consumption of corn by the human family, and by nearly all domestic animals, has greatly increased within the last few years. As an article of food it is unsurpassed, and in the opinion of many unequalled by any other grain or plant, combining as it does in suitable proportions all the essential and valuable elements required for healthfulness and nutrition. It appears from analyses that Indian corn contains more oil and starch than wheat, with less gluten, and, therefore, while scarcely inferior to that grain in nutritive value, far surpasses it, as well as the other cereals, in its fattening properties, which amount to nearly eighty per cent. of its composition. In point of nourishment it is second only to wheat, and even here the superiority of the wheat is rather nominal than real; for if due allowance is made for the loss sustained by wheat in grinding and bolting, it will be found that a pound of corn yields quite as much nourishment as a pound of wheat. It is four-fold more nutritious than the potato, which has long been the great staple and staff of life with a numerous class; and it has been proved by experiment that corn meal will sustain a working man longer, when fed upon it alone, than any other grain. The *American Agriculturist* says, that for the colder half of the year the oil and starch of the corn are better adapted to the wants of the body, than the large amount of gluten in wheat. It is also to this peculiar property of corn that it largely owes its unrivalled excellence for fattening purposes. All domestic animals are easily and rapidly fattened when judiciously fed with corn meal, and what is of still more importance, the flesh thus acquired is firmer and better than that produced by any other grain. By the analysis of Dr. Dana of Lowell, Indian corn contains of

Fat forming principles, gums, &c., - -	88.43
Flesh forming principles, gluten, &c., - - -	1.26
Water, - - - - - - - -	9.00
Salts, - - - - - - -	1.31
Total, - - - - - - -	100.

A glance at this analysis will show how greatly the fat forming principles predominate. We may, therefore, safely say, that Indian corn is a most profitable crop, especially as we may add to the uses thus far named all the different forms and variety of ways in which it is now used, being not only used as a necessity by millions of the human family, but also when made into corn starch for the preparation of blanc-mange, puddings, &c., for which it is better fitted than the flour of wheat. It is not only a food of very high nutritive value, but in some of these forms becomes a luxury. Being also rich in nitrogen, it is a stronger and more stimulating food than any of the other cereals. In proof of this, it may be said that horses which consume it are enabled to perform their full share of labor, are exceedingly hardy and need but little care; and the inhabitants of countries where it forms a large share of their food, are for the most part strong, healthy, and long-lived.

Its flexibility of organization makes it very easy of adaptation to climate and soil. On every part of the globe where the hand of civilization has broken turf, this beautiful and useful grain receives a large share of attention. There are varieties of it which can be raised in tropical climates, at a height of more than nine thousand feet above the level of the sea. The warmest region of the torrid zone produces Indian corn in abundance, where three crops can be taken in a season; and also the short summers of the northern climates have their varieties; so that it is raised from Canada to Patagonia, through almost every climate and people, and over an extent from north to south of more than seven thousand miles. From the extent of its cultivation, and the immense production, it may be considered as the most valuable of all the grains, and the best adapted to the support of animal life. It has been said that what the potato is to Ireland, Indian corn is to the world.

As an article of food it enters into daily use in many of our New England families; nor does the cheek flush with the crimson blush, when our hardy sons and daughters are told that they are "corn fed." It is our great native cereal, of which we are justly proud; and we may say that *corn* is king, when we consider the vastness and value of the crop, the immense amount of animal food yearly produced by its use, and the measure of wealth and comfort which it furnishes to mankind. The importance of the corn crop cannot be overrated. According to returns from the Department of Agriculture for the year 1870, the amount of corn raised in the United States was 1,094,255,000 bushels. Indeed, there is hardly a man in the whole community, who has the imagination to conceive of the vast amount of this crop. We are told, too, by the same report, that the average price per bushel for that year was 54 9-10 cents, making the value of the crop $601,839,030. We hear a great deal about our national debt, but the value of our corn crop for less than four years would wipe it out. Now, let us suppose that by increasing our care, by paying more attention to the wants of the crop, we should raise two bushels of corn where we now raise one (and I believe this to be possible), what a mighty impetus would be given to the nation! If by this five hundred millions were added to the income of the farmers of the country by the increase of the corn crop, the whole community would feel this wonderful impetus, everything would respond in the most magic manner to this increase. Now, if these vast moral and physical results will follow from this increase of our crop, is it not worth while for us to try to stir up our sluggish brains and lazy bodies to higher aims? If we should do this, if we shall only commence to-day, the labor and expense of these meetings will be most abundantly paid.

As an article of export, a very small per cent. of our corn is sent abroad directly, but is indirectly exported in various forms more remunerative to the farmer, and more profitable for the country. Indian corn enters in a larger or less degree into nearly all the beef, pork, mutton, butter, cheese and lard products by the entire farming community. These products are not only in great demand for domestic consumption, but are all of them, with the exception of mutton, largely exported. The beef shipped to Europe from the port of New York during the last three years, amounts on an average to forty thousand barrels and four thousand tierces per year. The pork shipped during the same time, exceeds one hundred and forty-seven thousand barrels, on a yearly average; and other meats exported, amount to over one hundred million pounds a year. But far the largest consumption of Indian corn is by our own people, the market for which is now easily reached, is vast in extent, and constantly increasing in its demand.

Not only as a direct article of human food, is this grain largely consumed at home, but also, and to an almost incredible extent, as provender for the immense number and variety of our domestic animals. In a general view then of the use of corn, we discover how great a proportion of the crop is used for conversion into other kinds of food, and how largely it is fed out for this purpose on the farm where it is raised, thereby tending to increase the prosperity of the farmer by improving his soil. And herein lies another great advantage of this cereal over wheat, the result in the two cases is very different—the corn which the farmer converts into other products may be sent abroad or sold in any market without reluctance and with advantage, for it leaves an enriched soil behind it, and brings back wealth to the country; but when the wheat crop is sold, whether at home or abroad, an integral part of the farm is sold with it.

Another profit of the corn crop over other grains, is, that when the offal is properly managed there is no other crop that returns so much to the ground. It is a fact that it may be cultivated longer in succession than any other grains. When we speak of corn offal or fodder, we mean the corn stalk, husks and leaves. Some of our best farmers are of the opinion that the corn fodder grown upon a rich soil, will pay for harvesting the crop; that it is better food for cattle than wheat or oat straw, and worth as much or even more for milch cows and young cattle than hay.

The value of corn fodder is in fact greatly under-estimated; but that value, it should be borne in mind, depends very much upon cutting it at the right time, curing and housing it well before its strength or juices are washed away by our heavy autumnal rains. The fodder of the Indian corn has come to be a large and valuable item in American husbandry.

Its nutritive value for feeding purposes, and the amount yielded per acre, render it intrinsically and practically an important crop. When to the various forms of the stalk crop is added the immense supply of sweet corn, cultivated by the farmers for table use, we have still another addition to the aggregate yield of stalks, as well as further contributions of grain to the general stock, thus exemplifying the manifold utilities of this cereal, which through so many and various channels pour annually into the storehouse of the husbandman its munificent supplies of food for man and animal. The intrinsic worth of corn stalks to the farmer for feeding purposes, and its nutritious quality as compared with straw, hay and other forage, may be determined by a comparative view of the constituents of each, and also more reliably, by a series of trials or experiments in feeding. The experiments of enlightened cultivators places the corn-stalk far above the straw of the other cereals in nutritive value, and justly ranks it, when properly cured and rightly treated in feeding, as equal to most kinds of hay.

The stalk crop of the country, including all the fodder of corn raised for all purposes, amounts to about forty million tons. There is no regular market price for this fodder, but its value is not any less for this. There is a difference of opinion in regard to the value of corn-stalks; we will assume that they are worth four dollars a ton on an average, but when turned to the best advantage they are worth nearly or quite double that amount. Taking the grain then at seventy-five cents per bushel, and the fodder at four dollars per ton, the total value of the corn crop for 1860 will foot up as follows:

838,792,740 bushels of grain at 75 cents - -	$629,094,549
40,000,000 tons of stalks at $4.00 - - - - -	160,000,000
Total value of crop - - - -	$789,094,549

Maine, in 1875, is estimated to have raised 1,300,000 bushels of corn. Rhode Island, Oregon and Nevada are estimated below Maine, and eighteen States produce more to the acre, while twelve States produce less than Maine. Less than one per cent. of the crop is raised in New England, yet the New England States have increased their crop the last year 300,000 bushels; indeed, Maine alone should have done this. If southern corn is worth 85 cents per bushel for us to feed our stock of any kind, corn of our own raising is worth one dollar per bushel, as by reason of its superiority over southern or western it is worth 15 per cent. more. Now, is it not easier to raise our own corn than to buy it? The farmers buy seventy-five per cent. of the corn that is bought in the State. We are seldom at the depot when the freight train comes in, when we do not see a car load of corn left; and when our rivers are open every flood tide brings a cargo into the State somewhere. Reliable estimates show that not less than three and a half million bushels are imported into the State, at an average of 80 cents per bushel; which would aggregate the enormous sum of $2,800,000.

Now we *must* raise corn to stop this enormous importation of it into our State, or if we will import it, we must raise *something else that we can export* to offset it. Let us export $200,000 worth of honey; let us export $200,000 worth of eggs, in addition to what we are exporting now; and then let us scrape the coop and raise all the egg-fed corn we can. Let us produce $100,000 worth of maple sugar or syrup, if not for export, to stop our enormous expenditure for imported sugar and molasses. If that does not give us sweet enough, let us raise sugar beets, which we can do every time, and turn them into sugar. Let us send back every car that brings a load of corn into the State, loaded with the best varieties of our late-keeping apples, which from their solidity of texture bear shipment better than any others, and by their rich flavor make a market for themselves in any part of the world where we send them.

We can hardly imagine the amount of money that Maine pays out yearly for corn. This ought not to be so. We have too long remarked in this wise: "We must sell a little hay to buy some corn; we must sell a few potatoes to buy some corn; I did not raise any corn last summer, and I must cut and haul some cord wood to buy some." Let us change this old song and get a new one, which shall be like this: "We will raise our own corn; we can do it; we can double the amount raised on an acre, and we can double the number of acres—thus saving our hay, potatoes and wood, to be turned to money for some other purpose."

I appeal to you, brother farmers, to this give subject your earnest attention. Upon us, more than others, rests the duty of making our State what she might be. Let us agitate this matter until the old worn out and inefficient system is dispensed with, and something better adopted in its stead.

Before closing, allow me to say that Indian corn is one of the most beautiful plants that grows in New England. One unaccustomed to it, is struck with its symmetry and beauty; and were it less common, we should never pass it without paying it the homage of our admiration. The tall, glossy stalk, tapering from its roots, strengthened by joints at regular intervals, adorned with long, graceful leaves from every joint, and ending with a tuft of tassels at the top, slightly bending under its own weight; the ears projecting from the joints just at the height from the ground as not to endanger the plant; covered with their bright green husks, and displaying their silky threads to catch the pollen from the tassels and fructify them—what plant has claims to greater beauty? Look at its roots, projecting every way to support it. The ripe grain—How beautiful the full ear, glowing in varied colors—the pearly white, the golden yellow and the ruby red; protected by the encircling husks from the rain and frost! To the farmer's eye it has other beauties. It is his crop of crops. None more certain, none more productive; none that will better repay him for extra labor and care; every part has its use, from the butts which slowly yield to the great law of decay, to the stalks, the leaves and the ripe grain—the last furnishing food acceptable and nutritious to the inhabitants of all portions of the world.

"There shall be an handful of corn in the earth, upon the top of the mountains; the fruit thereof shall shake like Lebanon, and they of the city shall flourish like grass of the earth."

DISCUSSION.

Mr. GILBERT. There are one or two points which have been brought out which deserve further consideration. One of these is, that under proper management corn is a sure crop. This is an important fact. Has it presented itself to your mind as the discussion has progressed, with sufficient force? I believe that in a large part of the State of Maine, and on the larger part of its farms, that corn is as sure as any other crop that can be grown, with the possible exception of the grass crop. When you are endeavoring to raise corn you are pretty sure of success, provided you act well your part. That is an important thing and leads directly to another point. What are the conditions of success? They are plain and within the reach of all. The first is a proper selection of the soil. What is, then, a good soil for corn? A good warm soil, with porous undersoil, so that the surplus water may be carried off, and no excess of water remain on the soil after the seed is planted. This condition of the soil does not lie wholly with Nature. If your soil does not possess these characteristics, you may modify it by taking off the surplus water by artificial means—by drainage, so as to get a warm soil. Loamy soil is good corn soil. The alluvial soils which we find along some of our rivers, are good corn soils. My friend from Franklin county can tell you of splendid crops grown on the intervales of the Sandy River. The latitude is high, the snow deep in the winter, but they grow splendid corn. So it is with the intervales of the Upper Androscoggin and the Saco. In these valleys the temperature runs higher than upon the hills near by, and so where the conditions are equal, the corn in the valleys will be driven forward and succeed better than that on the hills. A good warm, well-drained soil then is the first condition; and next (and this has been brought out quite prominently) make it rich. You cannot grow ninety, seventy-five, fifty, or even forty bushels of corn to the acre, without supplying food for it. We do sometimes have existing in the soil when we commence to handle it, corn food enough to grow a light crop, but to get a good big crop, you must make your land rich. You have the means at your hand to a far greater extent than most people are wont to suppose, to do this. There is little danger of making a soil too rich for corn. Corn will bear very heavy manuring and pay well for it, and if more is supplied than the crop can appropriate you will hear from it in the subsequent crops.

Having the land rich, here in the State of Maine we must start the crop early if we would secure a crop every year. We have short seasons, and corn growing here is a different thing from corn growing in Illinois, New York or even Massachusetts. I know this, for I have grown corn in Massachusetts as well as in Maine. Their seasons are longer than ours, and consequently methods that may be laid down for growing corn in Massachusetts, will not produce like results every time in Maine. It becomes, then, absolutely necessary to have the plant start vigorously as early in the season as possible. I do not mean by this that we should plant very early. Never plant corn until the soil is in proper condition—warm and pliable, if you do you will retard your crop instead of hastening it, because neither temperature nor soil will be fitted for it. This raises the question, How may we be absolutely certain of starting our corn early in the season? The answer is very simple—Give it something to feed upon at once; something that it can appropriate as soon as it germinates. Let a kernel of corn germinate in a cold, lifeless, unfertile soil, and what is its condition? There is no plant food within its reach and it cannot grow, and remains just where it is. By and by, late in the season, the manure becomes decomposed, and a portion of it reaches the plant; but, alas, it is too late to insure a crop. You have not done your duty, and therefore failed. But if you had started it early in the season, it would have grown throughout the season, and you would have had what you were reaching after—a good yield.

Corn wants, then, some thoroughly decomposed fertilizer in and about the hill. It makes no difference to the plant where you get it—whether you buy it, or obtain it about your premises. I care not where you get it, but get it somewhere and apply it. If you don't care to purchase, there are many fertilizers which you are allowing to go to waste, and which if appropriated in this direction would insure you success. If you prepare it, you see the necessity for having it thoroughly fined and decomposed, and highly concentrated. But, whether you will buy or purchase is your affair. It does not require a large quantity of it; if you have manured your soil well, the corn will appropriate your cruder manures, but not in its earliest stages; and for these the application of a small quantity of this available plant food is absolutely essential to success. Now, these are the main points in growing corn; and every one of you who owns such land as is required for corn, can go home and by observing them can grow, the coming season, a good crop.

I want to add a few words upon another point which has not been particularly impressed upon your minds—the importance of a thorough pulverization of the soil. The secret of a great deal of the want of success which attends much of our farming operations, lies in the slipshod manner in which we prepare the soil for seed. Our seasons are short, and we are anxious to get as much done in as little time as possible. Nevertheless, we should take time to prepare the soil so that the roots may have a good mellow bed from which to draw their nourishment, and in which they shall meet no obstacle in their search for it. The soil should be thoroughly mellowed, and if it is a good strong soil the deeper the better. It is also essential frequently to stir the soil after the plant has started into growth, and this stirring should be commenced as soon as the rows can be followed; I have done it many times before the corn was up. Now, what are the reasons for this?

Many of our soils will bake so that the sun's heat cannot penetrate readily through the crust, and consequently the progress of the corn is greatly retarded. There are other reasons to which I will not refer: this one is enough. Don't be afraid to cultivate early and often. I am very old fashioned in much of my farming, and many of my ideas, but there is one old idea that I always was at war with, and that is, that it injures corn to run a cultivator through it after it has attained any considerable height. I had something of an experience at hand hoeing when a boy, and learned then to be at war with this idea. You know it is rather dull business for a boy to take a hand hoe and follow a man, and do it not only to-day and to-morrow, but the week through. Nothing will drive a boy off a farm quicker than such an experience as this. Then don't be afraid to put your cultivator through your corn if you do disturb a few roots. You are doing good; if you don't believe it try it on one part of your piece and watch the results.

Mr. Farrington. I wish to allude to the principle that enters into the mechanical cultivation of the soil. I think one speaker said, yesterday, that after a certain time he would not put a horse and cultivator between the rows of his corn, because it would break off the roots. Now, I believe it has been demonstrated that you may break off some of the roots, not only without injury, but with actual benefit to your corn. As soon as the corn shows itself above the ground, it commences to throw out its little rootlets, and as it grows sends them further and further into the space between the rows. As you run the cultivator through for the first time, you cut off several of these rootlets, and from each of these ends will be sent out a number of little rootlets. By the next hoeing the roots will have grown longer and the implement should be set narrower so as to run further from the hills, and in this way you will again increase the number. Thus, if at the first hoeing each root cut off sent out five roolets and at the second each of these sent out five, you have twenty-five mouths availing themselves of the fertility that you have worked into your soil. This proposition was enunciated as long ago as the time of Jethro Tull, and looked upon as one of his vagaries. It is now being brought out by Dr. Sturdivant on his farm, and he regards it as a very important matter. It may be said that this will exhaust the soil. But this is what you want to do. What do you put the fertilizer in there for, but to feed the plant? You want to adopt such a mode of cultivation as shall make it most immediately available for all our crops.

Mr. **Harris**. Is not the tendency of this cultivation to increase the corn rather than the stalk, consequently giving a larger crop of corn in proportion to the stover?

Mr. **Farrington**. I should answer that question in the affirmative. The reason is, that the stalk is principally fed by the nitrogenous element, and by cultivation we render the mineral part accessible in greater proportion than the nitrogenous, and so increase the grain in greater proportion than the stalk.

Mr. **Chase**. The gentleman has introduced a theory which conflicts with mine. I would ask him how near, how often, and how long continued the cutting should be, to secure a good crop of corn?

Mr. **Farrington**. Any principle carried in practice beyond reason, may become destructive. It is one of the beauties of agriculture, that you cannot lay down a law of practice that shall govern every one. You can lay down general principles, and from them every man must deduce his own practice. The farmer, if just to himself, is a man of reading, of thought, of mental culture. I have no doubt that taking the general principle I have laid down and practicing upon it, every man will come to such a system of practice as shall for himself be the best. Allow me to ask you, gentlemen, never to say to your brother farmer, "This is the way you must do." You don't know it. His conditions are different from yours. Tell him, then, the principles upon which the thing is based, and let him work it out for himself.

Mr. **Stuart** of Newport, being requested to give his method of raising corn, said: If you are going to make a large amount of gilt edged butter, you must first procure a good cow and then procure good feed for her, or you will fail. If you have a colt which you are going to bring to 2.20, you have got to take care of that colt or you will not be successful. So if you are going to raise corn, you must have good ground and prepare it well and feed it. The selection of the soil is no small thing in the cultivation of corn; there is as much difference in soils as in methods of cultivation. Years ago I raised considerable corn, with good success. I do not raise as much as I used to, but I think I have learned as much by observation as I did by experience. I think the old practice of laying out so much labor can be done away with. I would prefer to manure the ground in the fall if we have the manure to apply at that time, but many of our farmers don't have it. I am of the opinion that manure applied in the fall is better for the following crop, but that it does not do so much good for future crops as it does in the spring when the manure is newer. If I were going to prepare a piece of ground for corn, I would break up a piece of greensward. My ground is nearly flat—you would call it quite level—and naturally very wet. It is not much use to try to raise corn or anything else on land that is wet. By underdraining I have got my ground so that I can cultivate it very well; most people would call it dry enough. I would take my ground about the middle of May, and would plow it very deep and well. I would put on manure enough so that after taking off the crop and a crop of grain the year following, I could cut two and a half tons of hay to the acre. By putting on manure and having the whole well pulverized, I am sure of a good crop every time if I take good care of it. I think the cheapest way of managing, is to take a potato marker and lay the rows about 3½ feet apart. Scratch it so as to make the marks plain, and then apply some kind of fertilizer—it makes no difference to me where I get it, if I only get it. I apply but a small amount in the hill. It has always worked well with me when put on top. I don't want to put the seed in less than four inches deep. I plant with a corn-planter. I want my ground dry and warm before the seed is put in. I don't care how soon the cultivator is put in, nor how much you cultivate, but be sure to cultivate enough to keep down the weeds. It is very necessary to stir the ground if it bakes, but with me if the corn is covered four inches deep the ground don't bake, and in that case I don't see that cultivating has any effect except to keep the weeds down. I would recommend the use of a cultivator that don't hill the corn. So far as cutting off the roots is concerned, if the ground is sufficiently drained I would risk it, but there should be a sufficient amount of roots to sustain the corn if the side roots were all cut off. But if the ground is wet so that the roots are compelled to keep on the surface of the ground, I don't think it would be well to have them cut off. If the ground is dry I will risk the damage, and I concur with the opinion of Mr. Farrington, that it would be a benefit. I think the practice of manuring in the hill takes too much labor. Last year I put Bradley's phosphate on manure for about seventeen rows; then I planted some on stable manure alone, which did not do as well. Then I tried a few rows with nothing but Bradley's phosphate in the hill, and it was as good corn as any on the piece. I would recommend, if your ground needs draining and you cannot underdrain it, that by all means you should surface drain it.

Mr. FLINT. I am very forcibly reminded of the cranberry discussion at our last session, from which half a dozen went home with their pockets stuffed with cranberry vines. Now if we will make the same rush for this corn, go home, plant it, and take care of it, I think it will be a good thing. There is a question as to the cost of raising. From some experiments made by myself and a neighbor of mine, I am satisfied that it can be raised, and raised profitably. Figuring everything, my own cost me less than fifty cents per bushel, and my neighbor, purchasing his manure, and knowing just what the cost was, got his for less than thirty-five cents. These experiments have proved to my satisfaction that corn can be raised for less than fifty cents per bushel.

Mr. **Winslow.** I dislike to disagree with any one, but there is one point which I should like to have ventilated a little more, and that is in regard to cutting off the roots. I think we are all agreed that we cannot stir the ground too much, but the desirability of cutting off the roots is another matter. I notice that when we cultivate late and cut up the roots, the corn stands still for a week. I want to know whether it is going by and by to make up for this stand-still. Sometimes the frost comes early and kills the corn before it is matured, and this makes the matter a very important one. Some one has said here that corn puts out roots two or three feet long. A few years ago one of my neighbors raised corn on a steep side hill. A heavy rain came and washed the corn out on some of the land, and there it was with roots at least six feet long all over the land. If you have never seen for yourselves, you would'nt imagine how long roots corn has.

Mr. **Smith** of Freedom. If you cut off a rootlet from an apple tree with a sharp knife it will put forth others, but if you break it off it will not. So if you take a hill of corn and cut the roots off these little spongioles will be sent out, but if you break it off with the tooth of a cultivator it will die, just the same as the rootlet of the apple tree will if broken off.

Mr. **Davis** of Corinna. We see readily that this question of the roots is a vital one. Our seasons are short, and we cannot afford to lose two weeks' growth at the first and two weeks at the second hoeing. If we do we may get a large ear and good stalk, but there will be a deficiency of corn. We have to drive our corn with fertilizers to succeed in raising it, and if we lose this time the frost will come before the corn is ripe, and it will be nipped in the bud. The theory of the gentleman would be a very good one if the seasons were long enough, but we must take all the conditions into account. I have been raising corn for thirty-two years. It is the best crop I have. I have raised fifty bushels to the acre, but have not succeeded in going much beyond that. I did this by buying fertilizers, but that costs a good deal. It is hard for poor farmers to get money to buy fertilizers to raise corn.

We want to know what dressing to apply to different kinds of soil. We cannot learn without experimenting, and it takes so long to experiment that we get tired of it. I cultivate my corn the first time with a cultivator, and hoe with a hand hoe; the second time hoeing I use a horse plow between the rows, because I don't want the large roots cut off. I think four inches is about the right depth for planting. Generally, we do not cover deep enough. More corn is lost by drying up than is killed by covering.

Mr. HARRIS. My experience has been different from that of the gentleman. I cultivate nothing but sweet corn, but I suppose that the practice would be the same as with other varieties. I have raised $100 in money value from an acre. If your land is in good condition it will do no damage to keep stirring the ground between the rows. The stalk will be smaller, but the grain is what we go for. I believe in level planting, and pretty deep covering. There is another thing which I have never practiced, but should not hesitate to. That is to take a smoothing harrow, where the corn is planted on a level surface, especially if it were covered four inches deep, and harrow until it was four inches high, and not mind the rows.

Mr. STUART. I plant with a corn planter; if I planted by hand I should not want to plant so deep as four inches.

Mr. L. L. LUCAS of St. Albans. I think that more farmers will succeed by adopting certain rules, than by any theory. These are the rules that I would lay down: First, thorough pulverization; second, the addition to the soil of a sufficient quantity of barnyard manure and other fertilizers necessary to produce the maximum crop; and lastly, clean cultivation. Here I am reminded of a rule for this clean cultivation—"Never pull up any large weeds." I would recommend planting just as many hills as will grow on the ground, and not shut the light out from it, and that will depend on the number of kernels you put in a hill. I think the rows will be from three to four feet apart. Do all these things and you will raise corn, and I don't see how you can without doing them. They are all necessary—thorough pulverization, so that every particle of plant food shall contribute to the growth of the plant; thorough manuring, so that every plant may have sufficient food, and that the labor of cultivation shall not be wasted on an inferior crop; and clean culture, that the nutriment available may all go to the support of the corn which you want to produce. The idea of cutting the roots off for the purpose of increasing the crop, I cannot adopt. I can hardly believe that more fibrous roots grow from a hill of corn than is necessary. I believe the less we disturb the roots the better. I don't mean to say I am right, but it don't seem to me there are any more roots than are needed there.

Mr. **Marsh** of Newport. On this root question we want to go to the "root of the matter." The man who formerly lived on the farm I now live on, I first saw at work cultivating among his corn. He had a horse and plow, and had been half a day he told me training his horse to plow. He was plowing eight inches deep, and about four inches off from the corn-stalks. He turned a furrow from each row—turned the two furrows together, and the roots were hanging down where they had been cut off. He told me that that was his practice, and had been for years, and I have been told that he raised the best corn in this section. The soil was a heavy one—clayey loam. In regard to the corn which I have here, said to be a new variety, I will say that I got it of Isaac Chase of Corinna. He said it was sent to him from Oregon, and I think it is a valuable kind, superior. Almost every stalk has two ears. I commenced planting this year the 10th and finished the 14th of June, and cut it up from the 20th of September to the 1st of October. It can be raised anywhere in the State, if the land be well manured.

Mr. **Farrington**. It seems to me that the point I made in regard to basing individual practice on a knowledge of general principles, has been illustrated by the statements of the gentlemen here in regard to the depth at which they are most successful in planting corn. We know that it is a scientific fact that the corn crop must have sufficient moisture for its growth. Now, if I as a farmer, conclude that it is best for me to apply manure in the hill, I introduce a factor in my practice different from that of my neighbor who spreads his manure. The difference is this: the manure will dry up more readily than will the soil about it. So if I plant corn over that manure I must cover it sufficiently to retain the moisture which my corn must have; and so we have cultivators planting in this way, who find it best to cover four inches. If, however, I conclude it is better for me to spread my manure, I don't introduce that factor, for if I plant on a surface that retains the moisture, I don't need to cover so deep. If I should the kernel would be saturated with wet, and would rot. If the man who plants in the hill were to adopt my plan of covering one-half inch or one inch deep, his corn would dry up and would'nt germinate. Now don't you see that what we want is to know the laws that govern growth as applied to our condition, and adapt our practice to them. In regard to the effect of cutting off the roots, I have never tried it myself, but it has been tried by most reliable and careful experimenters, and I have as much confidence in the result of their experiments as I should if I had tried it myself.

Mr. **Reynolds** being asked to state his method, responded: I break up in the spring and sow oats. The next year I haul on well rotted manure. In the spring I plow and spread the manure. I do not often manure in the hill. I have put on phosphates with good results, and sometimes they have proved a failure. When I have my soil thoroughly pulverized, I make my rows four feet apart and put the hills three feet in the row. I drop my corn right into the dirt, and cover it about an inch and a half—though the depth depends something upon whether the soil be wet or dry. There has been but two years in the last thirty but I have raised a good crop. One of these the frost killed my corn; the other was the grasshopper year, and then I raised some good corn, though only about fifteen bushels from two and a half acres.

ON SOME OF OUR INJURIOUS INSECTS.

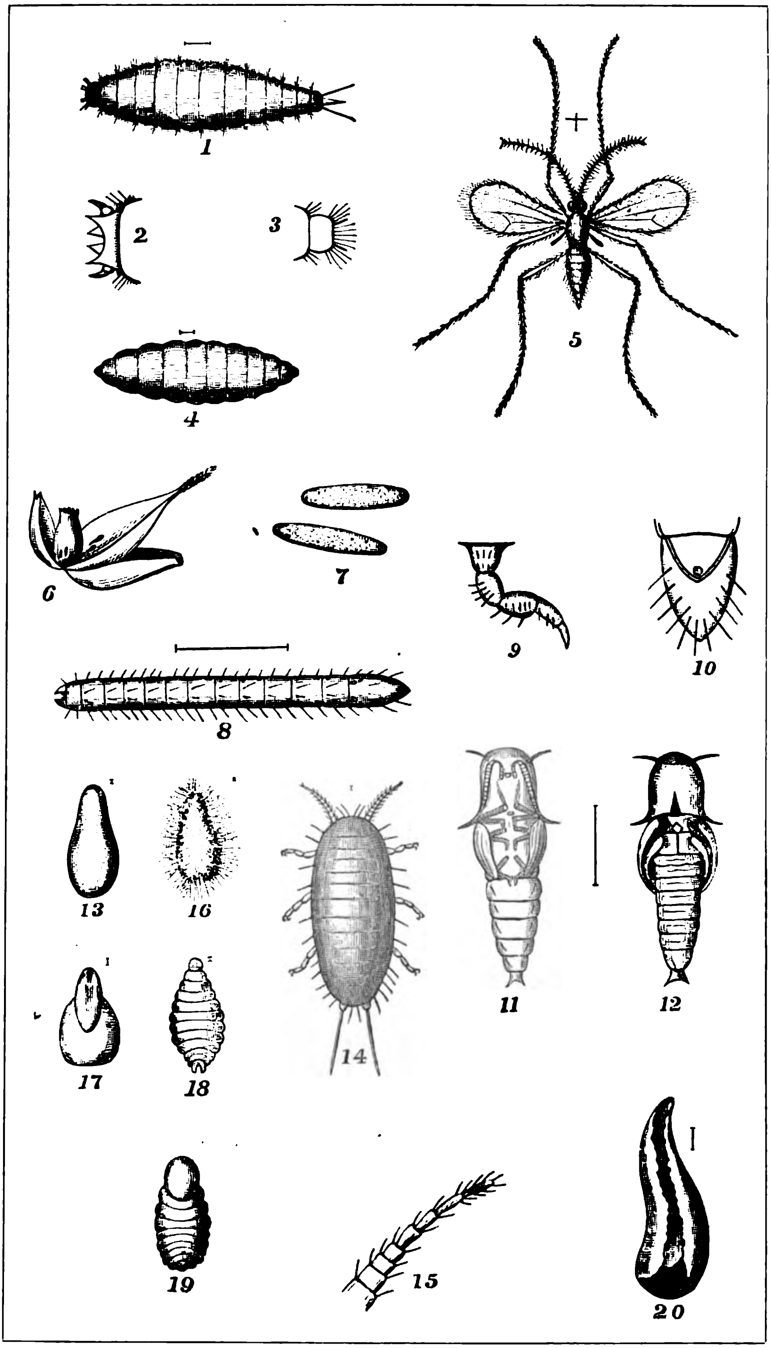
By Prof. C. H. Fernald, Maine State College, Orono.

Of the various insects with which the farmers of Maine have to contend, I have selected the following, giving as fully as I have been able, with the time at my command, their history and the methods of checking their ravages, so far as I know them.

There has, perhaps, been no insect which has caused so great destruction to the wheat crop in this State, as the wheat midge or weevil, (*Cecidomyia tritici*, *Kir.*) This insect was first reported in this country from northwestern Vermont, in 1820, though it was not until 1828 and 1829 that it became so numerous and destructive as to cause any serious alarm. Prof. Glover, in his "Manuscript Notes on the Diptera," states that this insect made its first appearance in 1830, in Canada, from the emptying of a straw bed by a Scotch emigrant, and spread in a circle of about thirty miles in a year at first. What his authority is for this statement, I am not able to say.

The Rev. C. J. S. Bethune of Ontario, thinks it probable that the midge arrived in this country some few years earlier than 1820, when it was first reported, and was introduced at Montreal or Quebec, in some wheat imported from Great Britain. Dr. Fitch of New York, states that the wheat midge made its appearance in northeastern New York in 1830, and in 1832 it had so multiplied as to completely destroy the crop in many fields. In 1834 it commenced its ravages in Maine, and has been an abiding though unwelcome guest with us ever since.

The earliest account of this insect in England, dates back as far as 1740. Again we have some account of it by Gullet, in



SOME OF OUR INJURIOUS INSECTS.

EXPLANATION OF THE PLATE.

1. Larva of the wheat midge, as seen crawling on a wet surface, with its horns fully extended.

2. Hind end of wheat midge, with sharp teeth protruded to aid in moving.

3. Forward end of wheat midge when attempting to crawl on a dry surface, its head partly withdrawn.

4. Larva of the wheat midge, as seen in repose.

5. Wheat midge, female.

6. A flower of wheat, showing the larvæ of the wheat midge.

7. Eggs of the wheat midge, greatly magnified.

8. Larva of the wheat wire worm.

9. Leg of the same.

10. Last segment beneath.

11. Pupa, under side.

12. Pupa, upper side.

13. Egg of the Oyster Shell Bark Louse.

14. Larva as it appears running over the bark.

15. Antennæ of the larva, highly magnified.

16. Larva after having become fixed

17. Appearance of the scale after the second plate is formed.

18. Form of the louse soon after losing its members.

19. Form of the louse when full grown, and about to deposit its eggs.

20. Fully formed scale, containing louse as it appears from the under side when raised.

the "Philosophical Transactions of the Royal Society" for 1772, and again by Marsham, in the "Transactions of the Linnean Society" for 1795; but no scientific description of the midge was given till Kirby took the matter in hand, and described not only the midge but three of its parasites, and published the same, with illustrations, in the 4th and 5th volumes of the "Transactions of the Linnean Society." Kirby there named the midge Tipula tritici, but the genus Tipula has since been divided into several groups or genera, because it contained an inconveniently large number of species, and the genus in which the midge has been placed, is known by the name of Cecidomyia, and the insect in question is known to entomologists by the name of Cecidomyia tritici, Kirby, but to the farmer by the name of wheat midge, and sometimes it is called the "weevil;" but since this insect is no weevil at all, but belongs to an entirely different order of insects, and still further, since there are already more than 20,000 different species of the true weevil tribe known to entomologists, of which the *true* wheat weevil, pea weevil, bean weevil, plum weevil, and some 400 more, are common in this country, it is better to use the more correct name, wheat midge.

The wheat midge may be found in its winged or perfect state, from the last of June to the last of July, flying about everywhere in search of wheat fields. The sexes probably pair soon after the insects come out of the ground, for only the females are seen flying about; in fact, Mr. Kirby had never seen the males when he wrote his description, and Mr. Curtis in his essays in the "Journal of the Royal Agricultural Society of England," and also in his work on "Farm Insects," gives illustrations only of the female, and states that he had never seen the male, but Dr. Fitch has been more fortunate, for he has seen them and published a description of them.

The female midges proceed to deposit their eggs in the crevices of the wheat blossoms wherever a chance is found, working upon the wheat heads only during warm, damp evenings, or cloudy days, hiding themselves near the ground in the shade of the plants during the time the sun is shining brightly, for they flourish best in damp weather, while a dry atmosphere seems to be extremely unfavorable to them; hence wheat fields on low damp lands are more liable to be injured by the midge, than those on dry uplands. The eggs, which are deposited, sometimes to the number of thirty in a single ear, hatch in about a week, and from them issue tiny footless maggots, quite transparent and colorless at first, but afterwards they become a bright orange color. The larvæ feed upon the juices of the grain, causing it to shrivel.

In the early part of August the larvæ are full grown, and leaving the wheat descend into the ground, mainly during rainy or damp weather, for they are able to crawl along the stem while completely immersed in water, better than when dry, for in the latter case they become dried so that it is difficult for them to move. It is stated that they sometimes gather the little globules of moisture together in their downward course on the stem, till so large an amount has been gathered that it will slide down by force of gravity, when they let go their hold on the stem and ride down in the drop of water. At other times they contract themselves suddenly and are thus thrown off the plant, and fall. After they have reached the ground, they work their way down about an inch below the surface, where they form delicate filmy cocoons, glued to the surrounding particles of earth, in which they remain during the winter unchanged. Late in the following spring they change into the pupa state, and emerge from the ground as perfect insects, during the last of June. Quite a proportion, however, of the larvæ do not leave the ears of wheat, but remain in them during the winter, or in the winnowings of the wheat, retaining their vitality so as to produce the perfect insect in the following June.

In England the ravages of this pest are so comparatively unimportant, that the insect attracts but little attention. Mr. Kirby estimated that the amount of wheat destroyed there in a single season was five per cent. of the whole crop. In 1828, when it was unusually destructive in Scotland, it was estimated to have destroyed about a third of the late sown wheat. But whenever it has so multiplied as to become very destructive in Europe, it has very soon subsided, so that it has scarcely been heard of for a long time. Here, on the other hand, it has continued without those intervals of absence followed by the presence of the insect.

Mr. Kirby has described three different species of parasitic insects, that deposit their eggs in the larvæ of the wheat midge in England, and also a species of fly that seize and destroy the larvæ. It is well known that each of these parasites deposits a large number of eggs, and since the parasite is about the same size as the midge, only one egg is deposited in each larvæ, so that each parasite will cause the destruction of a large number of the midges.

The reason why the midge in England is common during certain years, and then will rarely be met with for a long time, is due no doubt to the abundance of its parasites in that country; for these parasites increase to such an extent during the years when the midges are common, that in the end there is scarce a midge that does not receive the egg of a parasite, so that the following year there is scarce a midge to be found, but a superabundance of parasites, the greater part of which finding no midges to deposit their eggs in, of course die leaving no issue, so that the parasites themselves in turn become scarce, and the midge after a time becomes abundant again. The same explanation may also be given to account for the abundance of the army worm, the forest tent-caterpillars, grasshoppers, and many other insects in this country, on certain years, and their scarcity on others. With so many parasitic enemies in England, the midge has never proved so destructive an insect there as it has here; and why measures have never been taken by our national government, or by some of the States where millions have been lost because of this minute insect, to introduce those parasites into this country, I cannot understand. When we consider the habits of this insect and of its parasites, we must see how slight a chance there is for the parasites of the midge to be brought over by accident.

It has been estimated that the amount lost by the ravages of the wheat midge in one year (1854) in New York State alone, amounted to $15,000,000. It surely seems as though every means should have been tried to stop such a fearful leak, yet I am not aware that one dollar was ever appropriated by any State or society for the purpose of introducing the parasites of the wheat midge, or those of any other injurious insect introduced into this country from Europe. The parasites of the midge may by some chance be brought over, and yet a century may pass by before some clod of clay from an English wheat field, containing the larvæ of wheat midges with their parasitic insects enclosed, shall be brought over with all the conditions preserved, which shall ensure their existence in a healthy condition, with both sexes represented, and all by chance. Dr. Fitch says in his report for 1861, "I can state this fact with confidence, we have no parasites in this country that destroy the wheat midge." Dr. Packard in his "Guide to the Study of Insects," says that Platygaster error, Fitch, is the chief parasite of the wheat midge, but Dr. Fitch himself states that it is not a parasite of the wheat midge, but an egg parasite on a species of Nabis, an entirely different insect. I wrote to Dr. Packard concerning the matter, and he informs me that he was in error in his Guide concerning the parasite of the midge, and that he knows of no parasite on it at the present time in this country. I have not been able to learn from any source that any parasite has as yet attacked the midge in this country. In the absence of any insect friend to help us hold the midge in check, I can only repeat the well known artificial remedies; burn all the winnowings of the wheat, as these contain many of the little yellow larvæ which would live through the winter, and produce flies for another crop if not destroyed. Plow deeply in the fall any field that has been attacked by the midge during the previous summer, and plant it to some different crop the next season. Sow as late as is consistent, that the plant may not come into blossom till after the operations of the midge are over. Sow wheat only on high or dry ground, as wet land is favorable to the midge.

OYSTER-SHELL BARK LOUSE, (*Aspidiotus conchiformis, Gmelin*). There are two kinds of bark lice infesting our fruit trees, but by far the most common, and hence the most injurious, is the so-called oyster-shell bark louse. The young hatch out in this State during the last of May and the first of June, when they distribute themselves over the trunk and branches, and if they are abundant, on to the smaller twigs and leaves. These diminutive little insects have their mouth parts formed into a long horny tube, which they thrust down into the bark and draw up the sap upon which they feed, and there remain stationary ever afterwards. In a few days they are covered with a white waxy secretion, which issues from the body in the form of very fine, delicate threads. Soon after this they lose these fine threads, and the shell begins to be formed at one end, which gradually extends and covers them. During the latter part of August the bark louse lays its eggs, its body gradually shrinking beneath the shell as the eggs are laid, till they are all deposited, when the body of the louse is scarcely perceptible with a lens, and without doubt soon dies.

The oyster-shell bark louse produces but one brood a year, hence the eggs remain under the scales for more than nine months. If the scale be carefully lifted in July or August, the true louse may be seen; but if it be examined in the fall, winter or spring, a mass of whitish colored eggs may be found, some twenty-five in number. I do not need to tell you that these insects are injurious to the trees, for with their proboces stuck into the bark they suck up the very life sap of the tree, and when they occur in great numbers they must greatly weaken and even destroy it. Since the scales form so complete a protection for them, it is reasonable that they may be most easily destroyed after the young hatch, and while they are distributing themselves over the trees, or about the first of June.

Of the various washes that have been recommended, some do no good whatever, others kill the lice and also the foliage, still others kill about half of the lice and injure the foliage to some extent, but a strong solution of soap is said to kill them without injury to the trees. As the eggs do not all hatch at the same time, the application would need to be made for a number of days in succession. It should be remembered that these insects hatch out early or late, according as the season is early or late, and it will be well to examine the trees with care to see just when they begin to come out from under the scales, and then apply the remedy. The late Mr. Bennoch of Orono, was accustomed to sprinkle wood ashes over his trees which were infested with bark lice. This was done in spring before the leaves put out, during wet or rainy weather, so as to wash down over the branches and trunks of the trees. He informed me that in this way he never failed to destroy the lice, without doing the slightest injury to the trees. It seems to me that a more judicious course to pursue, would be to sprinkle the trees thoroughly with some alkaline wash, as strong soapsuds, just after the young lice have hatched and escaped from the old scales, and before they have secreted any protection for their delicate and tender bodies. Some kind of an atomizer would be useful for this purpose, and could also be used to distribute Paris Green water over potatoes.

Dr. LeBaron discovered, in Illinois, a minute insect about one twenty-fifth of an inch in length, which proved to be a parasite upon the eggs of the bark louse. It is to be hoped that they may so increase and distribute themselves over the country, as to hold these lice in check.

CUT-WORMS. There is a large number of moths in this State, the larvæ of which are called cut-worms, on account of the destructive habit they have of cutting or entirely severing the plants on which they feed, just above or just below the surface of the ground, during the night, and hiding during the day beneath the surface of the soil near the plant. Some of these insects attack only low growing plants, while others ascend shrubs and small trees, to feed on the leaves or buds. These all belong, so far as I know, to some one of three genera, Agrotis, Mamestra and Hadena, of which there have been enumerated two hundred and seventy-two species in the United States, over seventy of which have already been observed at Orono, but the natural history of only half a dozen of these has as yet been learned. It is not an easy matter to raise them in confinement so as to learn their habits, for as soon as they find themselves imprisoned they refuse all food, and crawl rapidly around the breeding cage, and as Dr. Fitch truly said, they literally travel themselves to death.

These insects come out in the perfect state as moths mostly in June and July, flying only in the night, and concealing themselves in the day time. After the sexes pair, the females lay their eggs, according to Dr. Fitch, on the surface of the ground around the roots of grass or other herbage. The worms hatch and feed on the most tender vegetation they are able to find. Grass seems to be their favorite food, and probably supplies them through the fall and early summer till they have acquired nearly their full growth, when they resort to corn and other crops during the remainder of their larval existence. When the cold weather of autumn arrives, they are usually about half grown, and then work their way down into the ground several inches, where they hollow out a cavity in which they remain till thawed out by the genial warmth of the next spring.

Of remedies for this cut-worm there are none, probably, so effectual as the parasitic insects that prey upon them. There are several of these known in this country, some of which are very small, so that a large number is raised from one cut-worm, while others are larger and only a single egg is deposited in each one. It happens with these, as with many other injurious insects, that there are times when they are abundant, and other times when they are scarce because of their parasites. Besides these most useful parasites there are other insects which are carnivorous in their habits, and prey upon the cut-worms, but these never multiply to such a remarkable extent as do the parasitic insects. There are certain species of the genus sphex which destroy cut-worms. Last spring, while at work in my garden, I spaded up a cut-worm which I put in a safe place, as I supposed, till at leisure to take care of it; but presently a large sphex espied it, and pouncing down dealt it a sting, not in a mortal part, but in the nervous cord, so as to paralyze all action and yet to retain life; then the sphex started with her cut-worm, or rather mine, but as it must have weighed several times as much as she did herself, it was no slight task for her sphex-ship to remove it. At first she seized it in her mouth and began to back off, dragging the worm after her, but the dirt gave way so under her feet that she made rather poor progress, and so tried another method; this time she stood astride of the cut-worm and seized it in her mouth at about one-fourth of the distance from its head, and lifting that end of the worm while the other end dragged on the ground beneath and behind her body, she made off with it at quite a fair rate of progress. By this time I was deeply interested in the performance, and left my garden work for observations in entomology. I was well aware that the entire family to which this sphex belonged laid their eggs in other insects, and I had repeatedly seen certain species seize upon spiders in this same manner, and bury them in the ground after having laid their eggs in them, but I had never before observed them taking so large an insect, comparatively, and one so generally injurious to the crops; so I followed at a respectful distance, feeling that if I had been robbed of my cut-worm, I would at least see what disposition was made of it finally. The sphex dragged it off to a somewhat sandy place, when she dropped the load, and with her fore feet began digging a hole. When she had dug down so far that she could no longer throw out the sand with her first pair of feet, she used her second pair also, and finally all of her feet. After she had dug the hole down some two or three inches she placed the cut-worm in the bottom, then depositing her eggs, she filled the hole and left, feeling assured, no doubt, that when her young should hatch, they would have an abundant supply of suitable food still living, sufficient to last them during their larval state.

The climbing cut-worms, those which ascend fruit trees by night, and destroy the leaf and flower buds, may be prevented by putting a wide strip of coarse, stout paper covered with tar or printer's ink around the trunks. This will also prevent the ascent of canker-worms, and many other insects. For those which attack corn and other field crops, I know of no better remedy than digging them up and killing them. Ashes, lime and other substances have been recommended as preventives, but they will burrow down in these as readily as in sand, and so far as I can see, it has as little effect upon them. It has been suggested, to make holes in the ground about the hills of corn, into which they may fall, and thus become entrapped till they are found in the morning and killed; also, to run a furrow around the corn field before the cut-worms leave the grass lands to attack the corn, having the perpendicular side next the corn, and thus prevent their crossing. I do not know how reliable this may be, but it seems to me, from what I have seen of them, that they would hardly be stopped by any furrow that could be run by a plow, however perpendicular and unbroken the landside might be. It might easily be done upon one part of the field, while it is omitted upon another, then the result would give some idea of the value of this method.

WIRE-WORMS. The wire-worms are also enemies to our cultivated crops as well as to our grasses. These are the larvæ of the different species of the great family of elaters (*Elateridæ*), or snapping beetles, of which Crotch in his check list enumerates five hundred and twelve species in this country, some of which are wonderfully numerous in individuals, and where they feed on our crops must do a vast amount of damage. So abundant are they at Orono, that in swinging the collecting net over the top of the grass in crossing the field, three or four of the perfect beetles have been aken at each sweep. We meet with these wire-worms in very different situations; some of them are found under the ground feeding on the roots of living plants, while others live in and feed upon decaying wood. While most insects feed upon one species of plant only, or at most on one natural order, the wire-worms are quite omnivorous, feeding readily upon nearly all kinds of plants, and the amount of injury they do is almost incalculable. Of the natural history of the wire-worm much has yet to be discovered. Bjerkander, a Sweedish observer, states that they spend five years in the ground in the larval state; and Curtis, Westwood and Packard have all copied this statement. Mr. Walsh has bred the larva of one species of elater in rotten wood in two years, and Dr. Fitch gives it as his impression that the larval existence of most of our field wire-worms, at least, is but two years, since he has discovered only two sizes in any collection he has made. Wire-worms are not easily raised in confinement; all my attempts in this direction have thus far proved futile, but I hope to be successful yet.

Mr. J. Pettit of Ontario, however, has succeeded in raising one species, which he calls the wheat wire-worm (*Agriotes mancus*, *Say*), in confinement, and perhaps it may be well to reproduce his account. Mr. Pettit writes as follows: "In the fall of the year 1870, so unusual an amount of damage was inflicted upon the wheat crops in this vicinity by this wire-worm, that I was led to try and breed it to the perfect state, with a view to ascertaining what species it was the larva of. By digging about the roots of the wheat plants, I obtained about a dozen specimens, which were placed with a few wheat plants in a large flowerpot, where they were kept supplied with food by planting occasionally a small quantity of wheat. With the first cold weather they ceased to eat, and were then placed in a sheltered situation until the return of warm weather, in spring, when they were restored to the breeding cage. They soon gave evidence of being alive, and possessing unimpaired appetites; their rapid consumption of the wheat plants rendered it necessary to renew the supply quite as often as before. They were fed in this way until the month of July, when my absence from home caused them to be neglected; on my return there was not a vestige of food left. Thinking that the worms had probably died of starvation, I paid no further attention to them until the 26th of August, when on removing a part of the earth from the pot, a pupa was disclosed, and on the third of September the first imago appeared, which proved to be a specimen of Agriotes mancus, Say. As only two more specimens came out during the remainder of September, I turned the earth out of the pot and carefully examined it; the inspection revealed seven specimens of the imago in the little cells in which they had transformed, and one larva.

Among the larvæ collected, I had noticed one less than half the size of the others, and evidently much younger, which would account for the one still in the larval state. It had attained, however, a size fully equal to that of the others when first brought in during the previous autumn; and hence I have formed the opinion that the larval state does not last longer than three years. This opinion has since been strengthened by the observation of a large number of larvæ, which appeared readily separable into two sizes, corresponding to those originally collected for breeding. * * * I am of opinion that our species is by no means so long lived, (as has been stated by Bjerkander) but that it attains maturity in three years—a period quite long enough, the agriculturist must think, in which to inflict damage upon the crops."

Wire-worms occur in almost every kind of soil, but as a general thing, low, moist, cold grounds, adjacent to marshes and streams of water seem to be favorable situations for them. Grass appears to be the most attractive and palatable to them, but wheat, corn, barley, oats, garden vegetables and flowers never seem to go amiss. Since they show such a fondness for the different varieties of grass, and as they have nothing to disturb them in their work in grass lands, it is to the crops grown on land the first year or two after it has been broken up, that the greatest amount of noticeable injury is done, though without doubt the injury to the grass crops has been as great but not so appreciable. If newly plowed lands could be planted the first year with some crops upon which the wire-worms could not feed, then they must starve or migrate to the adjacent fields, and of course only those along the border could so migrate through the soil before they reached the starvation point; but just here our knowledge is limited, for it is necessary to know which one of the five hundred species is infesting our land, also what crops it can, and what it cannot feed upon, then we are ready to make our selection. White mustard and buckwheat have been mentioned as crops which effectually secure the succeeding crops against these insects. Salt, lime, and rape cake have all been recommended, and on the other hand have been reported as utter failures. These conflicting statements seem to indicate that different species of wire-worms have been operated upon, and that what is destructive to one species is by no means so to another. Underdraining cold, wet lands infested with wire-worms, will, without doubt, so change the conditions as to diminish their numbers. Till we become familiar with the history and habits of the different species of wire-worms, we cannot expect an absolute specific for each one of them. I would be glad to learn at any time of experiments and their results. When we possess the information already mentioned, and have before us the life history of each of the wire-worms, with the various plants upon which each species will feed, as well as those upon which they cannot feed, we have then only to collect from the field we desire to cultivate, some of the perfect elaters we find in abundance upon the grass, as without doubt these represent the wire-worms under the ground, and determine the species, or, if we are not skilled in this work, send them to some one who can do it, so that we may know what we have to deal with; then, knowing what this particular species can and cannot feed upon, we shall know what crops to plant that the wire-worms may be destroyed in that portion of our field at least. To work out the life histories of the thousands of insects preying upon the crops in this country, about which at present little or nothing is known, will require the time and patience of a large number of the most accomplished in this department of natural history, with the most delicate appliances in many instances, and since the naturalists are not the persons directly benefited by such observations, we have had thus far but little done in that direction in this country. There should be a scientific commission established by the State or national government, comprising a sufficient number of the most noted in the study of insects, and also others as noted in the study of those parasitic plants, as rust, smut, mildew, etc., which are injurious to our crops, whose duties should be to make the most thorough and searching investigation into the history and habits of our injurious insects and plants, and conduct experiments upon them for the purpose of ascertaining the most feasible means of holding them in check. Such a commission would be quite expensive, but the saving to our crops, in a long series of years, would be so great that the cost would sink into insignificance.

DISCUSSION.

Prof. **FERNALD** being asked for some information about the Colorado potato bug, said: I have never seen a living bug, myself, and hope I never may, but if I stay in Maine I suppose I must. It has not been naturalized here, like many other pests, but is a native of America. It originated on the eastern slope of the Rocky Mountains, where it would have remained if we had remained away. But our people went there and carried the potato with them. This beetle fed on a plant of the genus *Solanum*, and when he got a taste of this new species of the Solanum, he rather liked it; and when he found that it was planted further east, he commenced to travel eastward. There is a northern limit beyond which they cannot go on account of the cold, and a southern beyond which they cannot go on account of the heat. I believe they have been divided into three divisions; the northern division cannot travel so fast as the others. They have reached Maine.

I cannot tell at what points, but I know of them as far east as the Kennebec; and having gone half way across our State in one season, there can be little doubt that they will pass over the other half the coming season.

I believe no better remedy has been found than Paris Green, which is very poisonous, so that it must not be put on at its full strength. It may be mixed, twenty pounds of flour to one of Paris Green, and sprinkled on dry when the leaves are wet. Flour is best for the purpose because it is sticky. This will kill them, whether in the perfect or in the larval state. Another method of applying, is by stirring up a table-spoonful of Paris Green in a pailful of water, and sprinkle on the plants. If applied in this way one can take his own time, if applied in flour one must do it when the dew is on.

QUESTION. Will not the lines on the potato bettle serve to distinguish it from any other?

ANSWER. In the larval state, when they do the most injury they look for all the world like the three-lined potato beetle, which has been so long in the State, though an entomologist would tell the difference at a glance. I don't recall any beetle that can be mistaken for the perfect beetle. Full grown, the size would distinguished it from the three-lined beetle; it is more than three times as large. There is one of about the same size that is found in the woods, but it is not found on the potato. I have brought here specimens of all the insects that prey on the potato: the Colorado, the three-lined, and the so-called Blister beetles, four different species. I have had them all sent to me from different sections of the State, to know if they were the Colorado beetle. That shows how little idea the people have of what they are to expect. Some were sent me from the town of Lincoln, that had caused considerable alarm, until I sent them a specimen of the Colorado beetle.

Mr. DUNHAM. Are there parasites which destroy the beetle?

Prof. FERNALD. Yes, there are a large number which are figured in the books. Besides parasites, there are insects that kill them, which would not be regarded as parasites. The lady-bug, for instance, and some other species, will destroy them at once. It seems to me that our children might be taught the difference between these injurious and friendly insects, so that they might gather those that are beneficial. There is one disadvantage in using Paris Green, that we kill the friendly insects with the injurious ones.

Mr. **LELAND** of Sangerville. I would like to inquire if bark lice can be seen by the naked eye by lifting the scale in August and September?

Prof. **FERNALD.** There is a great difference in people's eyes. I have used my eyes so much for these purposes that I could perhaps see them when a person unaccustomed to look at insects could not. I think they could be seen with the naked eye if looked for at the proper time. They look like little pieces of cotton.

The **PRESIDENT.** You have stated that the wheat midge might remain in the kernel and hatch next year. Can they hatch without going into the ground?

Prof. **FERNALD.** Yes; this has been proved. Why some do go into the ground and some do not, is more than I can answer.

QUESTION. What is the relative size of the full grown midges?

ANSWER. The length of the body of the perfect miller is about the same as the length of the larva.

Mr. **GILBERT.** How are we to account for the fact, that in certain localities in the State, where formerly the midge was so destructive that wheat was not grown for many years, that they have not been troublesome for a series of years unless some parasites have been at work there?

Prof. **FERNALD.** I expected that question. I have asked a great many farmers about it and read a great many authors. Some have thought it might be accounted for by the fact that not so much wheat is grown as formerly. I know 25 or 30 years ago my father had to give up raising wheat. I don't think there has been any wheat raised on Mt. Desert island since, so we might expect that the midges would become extinct. But in those localities where wheat has been grown right along, if there are such localities, it would seem as if there might be parasites. The authorities on the subject are agreed that so far as is known at the present time there are no parasites, but that does not say there are none.

Mr. **Leland**. Is it not quite possible that the farmers have learned to avoid it by early or late sowing? I believe it to be a fact that they sow at certain periods to escape the weevil.

Prof. **Fernald**. I think the insect is as bad as ever it was, and that if he had a sufficient amount of food he would be as plenty as ever.

Question. Do they feed on any other plants than wheat plants?

Answer. I think they feed on grass plants. I spend a great deal of time in summer evenings attracting insects into my room by a light, and a great many of these hover round my windows the last of June and July, and for about a month they are found on the grass.

Mr. **Leland**. Is the midge found on red clover the same as the one found on wheat? It has the same appearance to the eye.

Prof. **Fernald**. I don't know that there is any midge that feeds on red clover; it is a plant of a different order from wheat, and I should not think the wheat midge would feed on it.

Mr. **Gilbert**. On the farm which I occupy, there has been an effort made to grow wheat every year since I became large enough to harrow. There was a series of years, about twenty-five years ago, when those efforts were almost fruitless in results. But not liking to be overcome by that insignificant insect, we persevered in sowing it, and finally the midge entirely disappeared, so that it requires very much search to find a single specimen.

Prof. **Fernald**. Do you sow early or late?

Mr. **Gilbert**. When the ground is suitable—sometimes early, sometimes late. I don't regard the midge at all. I prefer to sow early when I can. I think I don't average sowing earlier than I used to. I have never been able to see any particular difference in their ravages on different kinds of wheat. There was a variety introduced supposed to be midge proof, but it did not meet with much favor in consequence of its making an inferior article of flour, and the sowing of it has been entirely abandoned.

Prof. **Fernald.** It is just possible that the gentleman has parasites in Androscoggin that are not distributed over the State. If on investigation it should be ascertained that there are parasites there, so very small that they have not the power to distribute themselves, it might be a paying operation to distribute them over the State. I know that the parasites of the cabbage butterfly are more abundant in some parts of the State than others. We have them at Orono, while they are not found at Mt. Desert. I had it in mind to send some there last season, but did not succeed in doing so.

Mr. **Rogers** of Stetson. I would like some information in regard to two enemies of our orchards. One is the little green louse that preys on the green leaves, the other is the borer.

Prof. **Fernald.** In the paper read by me at Portland, before the united societies, printed in the Secretary's Report for 1875, Appendix, page 17, I have spoken of the borer. I take it the common borer is meant. The beetle of this species has white stripes alternating with brownish ones. There is another one that preys on our trees, that is termed the flat-headed borer. I have not, within a few years, had a chance to get them. I think I should recognize them in the larval state. I have here a specimen of the larva of a species of borer that is as abundant in the Western States as the common borer is with us here. Both should be dug out of the tree and destroyed, and to prevent the beetles from laying their eggs an application of soap to the trunk of the trees in May is recommended.

With regard to the green louse, I have never seen them abundantly. They are not on the leaves of our trees in

Orono and vicinity. It secretes a greenish, sweetish, liquid. There are gnats which like this liquid, and at the proper seasons these gnats are found going out on the leaves and twigs where the lice are, and when they are ready to exude the honey-dew the gnats take it, and if they do not respond readily the gnats reach round with their antennae and tap them. If any insects injurious to the plant-lice are round, the gnats will drive them off and protect the lice, so that they are called the milch cows of the gnats. I don't know as they do any damage.

Sec. BOARDMAN. The borer is so destructive an insect, that any suggestion or device likely to help us bring it under control is of interest to fruit-growers. Mr. Hooker of Gardiner, has placed on exhibition in my office, a contrivance which consists of a piece of sheet iron brought about the tree and its edges fitted into pieces of wood, which are secured together by clamps so as to form a water-tight, tunnel-shaped cylinder, with the bottom an inch or two below the surface of the ground. Into this a pail of water is poured, which, Mr. Hooker tells me, will remain two days before it is absorbed by the atmosphere. He has tried it as yet only on a limited scale, but he says the borer is invariably killed—drowned out. The device is not patented. For myself, I doubt if it fully accomplishes the end desired.

Mr. SMITH of Freedom. In certain parts of Waldo county we have the borer, in others not. I have never known them in Freedom, and I think they are seldom found there. The tent-caterpillar has been very destructive with us. I should like to ask if any one has observed that an insect enemy has been preying upon them the past season. I should think that with us nearly a quarter of the leaves were of a golden color, and were infested with cocoons. I noticed that there were holes in these cocoons, and on looking inside I found that the insects were destroyed. I should think at least nine-tenths of them were destroyed in this way.

Prof. FERNALD. There are parasites of the tent-caterpillar. There are two kinds. I have brought them both. I have brought the eggs about the twigs, the full grown larvæ, male and female, of a number of sorts, with species of cocoons. We usually have them in breeding cages, so that our classes in entomology may study their habits. I would remark that the moth remains in the pupa state but a short time before it makes a hole in the ends of the cocoon and comes out.

Mr. SMITH. These holes were in the side of the cocoon.

Prof. FERNALD. I should want to be sure whether it was a parasite or the escape of the perfect moth leaving the pupa behind. The moth always escapes through the hole in the end, and if the hole was on the side it is the work of an enemy to the species. With the parasites there is one trouble, they have parasites that kill them.

QUESTION. Do all kinds of caterpillars lay their eggs on the branches they infest?

Prof. FERNALD. There are about 500 different kinds of caterpillars. I presume the reference is to the varieties of tent-caterpillars. They both lay their eggs in belts around the twigs of the tree, but they may be distinguished by the fact that the eggs of the common tent-caterpillar form an oval ring rounded at the end, while those of the forest tent-caterpillar are square at the end. You are very safe in getting off all the tents of either kind and burning them.

Mr. STUART of Newport. Last summer, just before haying, I turned my eyes to my field, and saw what looked as if some one had been mowing my grass and hauling it off. There was, I should think, an eighth of an acre where the grass was completely killed. It looked something as our worst fields did the caterpillar year. I don't know what it would be best for me to do with the piece, but I shall plow it up. I think I did not get twenty-five pounds of grass from the eighth of an acre.

At the suggestion of Mr. Gilbert, the members of the Board were called upon for reports as to whether the Colorado beetle had been observed in the different counties during the past season. Mr. Gilbert stated that it had been found in

Androscoggin county, in several localities, but not in sufficient numbers to do much damage.

Gen. **Brown**. I cannot give the names of all the localities where it has been found in Cumberland county. I had an opportunity to examine it pretty carefully, and I don't think I should ever mistake it for anything else in the world, or that anybody would after having seen or known it. It is reported to have made its first appearance in our county, at Deering. Two or three days after that, talking about it at my office in Portland, it occurred to me to go to a large potato patch in the city belonging to my father, where the beetle had not been observed. In five minutes after going in we found scores and hundreds of them. My brother, who had a garden not forty rods from this, never had a beetle during the whole summer. Soon afterwards I found them on my farm. We found them on a prolongation of the line from where they were first seen in Deering, and they did not seem to leave that line. It seemed as if they had been projected from a cannon and dropped all the way along. I fought them with Paris Green from their first appearance. This seemed to destroy them, and I suffered no serious damage from them. They were in great numbers. I suppose I killed thousands of them.

Prof. **Fernald**. Can you inform us the line of direction taken by them?

Gen. **Brown**. The direction of the track from Westbrook to my place was pretty nearly due east.

Mr. **Kyes** of Franklin. They have been found in two or three places in our county—in Jay, and one or two other towns.

Mr. **Bodwell** of York. It has been reported in one or two localities in our county.

Mr. **Reynolds** of Oxford. They have been reported in Oxford county.

A gentleman reported them as having been observed in Palmyra and St. Albans, in Somerset county.

Mr. Mallett of Sagadahoc. I discovered this beetle in very limited numbers on my potato patches. I made considerable inquiry, but did not learn that it was found at any other points in the county.

Mr. Ayer made a similar report from Waldo.

Mr. Leland of Piscataquis. They were found very near the station at Dover, and were recognized there by a gentleman who had been familiar with them in Minnesota. It was thought probable that they had taken a ride on the cars. In Foxcroft they were found in fields at considerable distance from the station.

These embrace all the counties where the bugs were definitely reported as having been observed.

BOOK-KEEPING FOR FARMERS.

By John Marshall Brown, Falmouth.

One of the most entertaining books I have ever read, is a small yellow covered volume, bought at a London book-stall, and entitled "How to farm profitably, or the sayings and doings of Mr. Alderman Mechi." The title, I suspect, will convey to your minds the impression that the writer was a talkative, opinionated and somewhat bumptious person, and, in fact, I believe he was; his book, however, is full of wise suggestions, and records very much valuable experience. Mr. Mechi was, if I am not mistaken, an ironmonger in London, and by dint of energy and prudence acquired a fortune, and rose to the position of alderman of one of the city wards, a title which means far more in England than we, with our notions of aldermanic dignity in American cities can readily understand.

Having acquired a fortune and a position, Mr. Mechi resolved to gratify a longing of his youth, and satisfy an ambition, which, to the honor of our cousins over the water, almost invariably accompanies the possession of wealth. He purchased an estate in the country, and carrying to it his experience and methodical habits, entered upon a plan of great magnitude for the renovation of the exhausted land. The farm proper consisted of 130 acres of heavy clay, and cost him in 1844, £3,250, or $16,250. The latest report of his operations, contained in the book referred to, is dated 1859, up to which time he had expended, in addition to the purchase money, £6,200, or $31,000. With this money he had thoroughly underdrained the land, with between 80 and 90 miles of stone and tile drains, 12 feet apart and 32 inches deep; had cleared off all timber, crooked fences and ditches; had made new roads, erected new buildings of brick and iron and slate; built his own residence, put in steam machinery, had pumps and tanks and pits, so that every pound and pint of manure was saved, and was able at last to say that his investment had been remunerative, and his property, on the English basis of ground rental, trebled in value by actual appraisal.

I instance this case, because here was a man without previous experience in agricultural pursuits, and who entered upon this new life as he would have engaged in any other business, laying aside for it such capital as he deemed necessary, and managing it in accordance with those sound business principles which had been the secret of his previous success. His maxim was, "Book-keeping on a farm is as necessary as in a warehouse."

There are few in our own State, perhaps none, who are likely to follow our London alderman's example, and yet it conveys a lesson which every one of us ought to heed.

How many of our farmers look upon farming as a business, just as manufacturing is a business, or buying and selling merchandize is business? How many look upon it as a make-shift to keep soul and body together? How many carry into their farm work the careful system of accounts which the manufacturer and the merchant find a condition precedent to their success? How many having managed to keep soul and body together, rest there and ask for nothing more? Mr. Mechi used to say that he never asked a farmer how many bushels of corn he raised, but how much it cost him to raise a bushel of corn. How many of our farmers could answer that question? Lord Fortescue, who like many another English nobleman was an enthusiastic and practical agriculturist, used to say, whenever applied to by one who wished to lease a farm, of which he had scores, "How much money have you? I will suit the acres to your purse." How many of our farmers think of making a proper apportionment of land to capital? Labor when *employed* is the best of capital, when *wasted* what a pitiful and miserable waste it is. How many of our farmers waste upon ten acres, the energies which would make one acre teem with abundance.

The census of 1870 gives the entire male population of Maine, between the ages of 10 and upwards, as 245,704; of this number, 33⅓ per cent. are reported as engaged in agricultural occupations, 82,000 in all, and of this number 9,570 are represented as having been born in the United States. This large percentage renders it absurd to speak of farmers as a "class" in the community. A body of men engaged in the same pursuits and numbering more than one-third of the able-bodied population—numbering, indeed, if we throw out of the account the large cities and manufacturing towns, three-fourths of the community at large—ought to be considered not a "class" but the community itself, and if there are different classes within this community, as of course there are, it is in obedience to the irresistible laws of equilibrium, which alone mark the social distinctions in a free land like our own, where every man is the peer of his neighbor before the law. So long as truth is better than falsehood, industry than idleness, thrift than wanton waste, knowledge than ignorance, virtue than vice, there will be different strata in society, and farmers cannot be excepted from the rule.

A natural subdivision of the farming community would seem to be:

1st. The farm laborer who works for his stipulated wages, having no interest in the work beyond and sharing none of the risks of the venture.

2d. The farmer who by the accident of inheritance, or by purchase, finds himself the owner of a farm, and is satisfied if by half-hearted labor he can keep his family from want, simply this and nothing more. Into his selfish soul enters no thought of his neighbor; he provides for himself and allows others to do the same. I am sorry to say, that of this class I have many in my mind to-day, and I doubt not the picture is too familiar to you all. He is usually a man of few pleasant words, morose and complaining, a hard father and unloving husband; the light has long since burned out of the eyes of his faithful wife; his children are impatient for release from the parental control. His life is a wicked failure and waste;

his example is a reproach, he is a hindrance and stumbling block in the way of all development and growth.

It is true that agriculture is the first step in civilization, but it is also true that a very high degree of physical culture is possible without it; that without it, even, there may be a high degree of national life. Nomadic races have played a prominent part in the history of the world. Witness the Tartar tribes who swept like a scourge through Asia to the west. Witness the years of wandering in the wilderness. Witness the aborigines of our own State, who, without permanent homes, made themselves a daily terror to our forefathers. But the Tartar and the American Indian were simply men in a state of nature, swayed by passion and interest. Without culture of the soil, no culture of the mind. But when it was found that one man could, by his industry, produce from the abundant earth food for five, it was also discovered that four men might be spared for other labors, so there came to be inventors and manufacturers, and sailors and merchants, and scholars and statesmen, and law and literature and good government, and at the bottom of all and bearing it all on his brawny shoulders, the *farmer* with his mattock and his spade.

This leads me naturally to the third and last class of farmers, who may be briefly described as those who make of farming a business, expecting from it not only sustenance but profit, producing more than they consume, and making non-producers dependent on them and tributary to them.

It is to this class of farmers that any remarks on the subject of book-keeping must be addressed. Some know enough about it already, but to many, I fear, it is new both in theory and practice. How many—to repeat the question asked before, know what it costs to produce a bushel of corn, or oats, or potatoes, a pound of butter, or cheese, or pork? I know many a farmer who has done well in the world, at whose feet I would gladly sit and learn, who could not answer one of these questions; who would say as some have said to me, "Confound your book-keeping, it will do for shop-keepers and bankers and merchants, but I am too old to go to school. I know that I pay my debts and make money, and that is enough; none of your new-fangled notions for me." Now it is very hard for a young farmer who is just learning the business, and whose carefully kept account books tell with inexorable accuracy that he has been losing money all the time, to reason with a successful veteran who thinks book-keeping a nuisance. But, in fact, in this is the gist of the whole matter. It is of more benefit to the community of farmers that one man should lose money if he knows and can show by his books how and why and when he lost it, than that another should make money if he cannot show how and where he made it. My account books are light-houses to warn others of the rocks and reefs on which my ships have gone to pieces, but my neighbor's success is the *ignis fatuus* which lures the ignorant plodder to his destruction. Imagine such a man who at the end of the year is able to say, I owe no money, and I have more money than I had twelve months ago. Ask him how made it, and he will probably say that there was a fortunate turn in the market, and potatoes advanced, or hay or something else, because there was a short crop. He has kept no account with his crops, and some may have failed miserably, but he cannot give the reason for it. Some day or other the market may turn the other way, but he cannot profit by his experience, because book-keeping, which is a reward of experience, has had no place in his farm economy.

Now, all business operations are but the investment and manipulation of capital; and capital, as has been truly said, "may consist in valuable resources, such as real estate, live stock, merchandise or cash, or in productive power, such as professional ability, technical training, physical endurance or industry, or in both." Again, the prime object of business is gain; and the substantial proof of gain is increase of capital. How thoroughly this applies to the farmer's occupation, and how necessary it becomes that the farmer should adopt such a system of accounts that he may know at the end of his year's labors whether there has been gain or loss, and be able to mark the cause of it, and if there has been disaster to put a buoy on the rock as a future warning to himself and others. In book-keeping, the unfailing evidence and test of success and prosperity is the balance sheet; no business is safe without applying this test systematically and regularly, and it is impossible to apply the test without a rigidly accurate system of accounts. "Book-keeping is the faithful and systematic record of business transactions."

All business transactions consist in an exchange of values; hence book-keeping is the science by which these exchanges are recorded and their results shown. Of this science there are many text-books and many teachers, but I do not think the farmers need waste much time on either; none that I have examined seem to meet the necessity of the farmer's case; and, indeed, I think that any man of intelligence, with a knowledge of simple arithmetic, and such limited technical instruction as may be gotten from any elementary treatise on book-keeping by double entry, can devise for himself a system of accounts.

And now, in the short time remaining, let me leave theories and come to the more practical details of the subject. I do not suppose it was intended that I should attempt to interest this Convention in book-keeping. I certainly should shrink from such an attempt, knowing that the result would be a ridiculous failure. All that I can do is to give some hints for your guidance. And when I assume that not many farmers keep a careful set of accounts by double entry, so-called, indeed, that very many keep no account at all, I trust that those present of whom this is *not* true, are so sensible of the importance of this subject that they will listen patiently to the somewhat dry details which follow. My suggestions are derived from my own experience. and have been tested by time.

As a necessary preliminary, ascertain what capital is available for the business. Therefore make a careful inventory, stating accurately and in detail the valuable resources of the farm, the number of acres of cultivated land, woodland and pasture, with its market valuation, the amount of stock of all kinds, crops on hand, manure in store, farm tools and implements,—neglect nothing that has value; and note in the inventory what the value of each item is. Have an accurate map of the farm drawn to scale, by an engineer if possible, showing the location of roads, the divisions of fields, situation of buildings; if there are underdrains mark carefully their position, so that they can easily be found. The small amount of labor involved in this preparation will be pleasant work, in which the whole family will cheerfully engage. If you have a herd of cows, and breed your own stock, prepare a herd register, whether the stock is thoroughbred or not; name every animal, and in the herd book enter the name, date of birth, distinctive marks, name and residence of her breeder, name of sire and dam, date of purchase and price, and when sold the date and price and name of purchaser. This method is absolutely essential to good breeding; it makes the herd a part almost of the family, and it is amazing to notice how much greater is the interest felt by all persons on the farm in this most important branch of husbandry. I do not hesitate to assert, that a collection of such cattle pedigree running through a series of years will result insensibly in the production of vastly improved stock, and a corresponding advance in market value.

These preliminaries settled, a map, a herd book, and an inventory, and we can begin our book-keeping. The blank books necessary are a day book, journal and ledger; these are necessary for the simplest forms of double entry, and are all that are absolutely necessary for the most complicated accounts. They can be furnished by any stationer for a small sum, and will last for years. In my own practice, and I strongly recommend its adoption by all, I use instead of the day book proper an ordinary office diary, of the folio size, with spaces for three week days on each page, ruled for dollars and cents, and with the usual tables, almanac, and blank leaves. In this book should be entered, daily, under its appropriate date, a record of all the operations of the farm, no matter what their character; specify each man's labor, how and where performed; note the time of plowing, cultivating, sowing, planting and harvesting; specify the fields and crops on which this work is done; enter all contracts and promises that are to be fulfilled in the future, all cash receipts and disbursements. Note the weather, the wind, the variations of the thermometer and the barometer, if you have one, and you ought to have one. All this will require no more than five minutes each day; and as the days go on the book will become a *vade-mecum*, a household treasure, to be constantly referred to in the future as a record of past errors and successes, each with its vital lesson. The blank pages at the end of the book can be profitably devoted to many uses—An account of family expenses, an analysis made weekly or monthly of the labor account, debiting each field or crop with its proper number of hours or days at the money value; a gestation account, supplementary to the herd book, giving date of service and time when due. A digest of market reports may be added, weekly, showing prices at the farm and in the market; and at the end of the harvest a summary of the crops by weight or measure, and then, finally, another inventory, item by item compared with that taken at the beginning of the year. The time involved in all this will be infinitessimal, the pleasure derived from it will excel your fondest expectations, and the ultimate advantage of it all to the farm and family immense. I am bold enough to say, that if this simple plan could be conscientiously carried out by every one of our farmers of the better class, (I accept of course those who do something of the kind already), there would be an immediate and lasting improvement in our agricultural prospects.

But all this, vital as it is, is but part of book-keeping; and here I must deal with dry technicalities, and I shall be as brief as possible. In the system of double entry, every person or thing which enters into a transaction is designated by a name in the books which is called "an account," and every transaction, as the phrase implies, is twice entered, once to debit and once to the credit of the proper account. The day book is the book of original entries; it is the record of transactions from which any accountant can readily make all other entries. The journal is the intermediate volume, in which these entries are made in appropriate business language. The ledger is the book which shows under each account all the debit and credit entries, the difference between the sums of these entries in the balance of the account. If the books are correctly kept, the sum of the debit balances will exactly equal the sum of the credit balances, and thus give a picture of the operations of the year. With the assistance of the inventory a balance sheet can be prepared, which will be an absolutely accurate statement of gains and losses, and show at a glance whether there has been failure or success. Perhaps one or two illustrations may make this sufficiently plain.

The diary shows that on a certain day four men and two teams ploughed for barley. Barley is an account and labor is an account. The entry on the journal is: Barley debtor to Labor so much, whatever the money cost of the labor may be. In the ledger there is a double entry. Barley is debited for Labor, and Labor is credited for Barley.

On the 31st of May, $30 was paid to one farm hand. The journal entry is: Labor debtor to Cash, and in the ledger Cash is credited with Labor and Labor is debited with Cash. On another day 100 bushels of barley are sold. Barley is credited with Cash and Cash debited with Barley. A horse is bought and paid for with a thirty day note. Journal entry, "Horse stock" debtor to notes payable. On the ledger, Notes Payable is credited with Horse Stock, and this amount, so long as it appears in the credit balance, is a "liability" until the note is paid. The journal entry is then Bills Payable debtor to Cash, and in the ledger the entry appears on the credit side of cash and debtor side of notes payable, which account now balances, and is cancelled because the liability no longer exists.

The application of these principles is a matter of no difficulty. If the diary has been faithfully kept, the assistance of any elementary work on double entry book-keeping will enable any farmer or farmer's son or farmer's daughter to keep account of all the varied transactions incident to agricultural pursuits. It is impossible, gentlemen, to overestimate the benefits which the entire community would derive from the general adaptation of this practice. But if one, only one, is led into the way of order by these hastily prepared remarks, I shall feel that the labor has not been in vain.

The proud motto of Maine is *Dirigo.* More than a third of our active population is engaged in agriculture, and yet, to our shame and reproach, we are not even classed among the agricultural States. Here are vast resources undeveloped, I might say undiscovered; rivers wasting their powers in their fruitless course to the sea. Here are thousands of citizens living out their weary lives in labor without gain.

Farmers of Maine, turn over the leaf of history whose record is completed to-day, make a new entry on the fair page to be opened to-morrow. Make of your occupation a business; engage in it as the business of your life. Keep account of it as every other prudent man keeps account of his business. Do this and you will not have long to wait for your reward. The balance sheet is wofully against us now. Do this and we will soon have the balance on the credit side.

COMMERCIAL ASPECT OF POULTRY RAISING.

By W. W. Harris, Portland.

Poultry raising during the last decade has received more attention than ever before in this country, and to-day we see a marked change in the quality and quantity of stock raised, compared with what it was ten years ago. The improved condition noticeable in both quality and quantity is not confined to our own State, but the interest in this branch of stock raising is wide-spread, extending all over our country; and to-day almost every State in the Union has its State society, and many like our own, its County societies, devoted to this interest. To the influence of these societies, by their annual exhibitions, to the efforts and example of leading members, to the poultry journals, and the agricultural press, we are in a great measure indebted for the increased and growing interest in this branch of stock raising, and our annual poultry exhibitions have shown a large variety of very choice stock, and received a generous support and hearty approval from our citizens.

It was thought ten years ago, that very little attention was necessary to bestow upon the poultry yard. Poultry houses were then not thought of; any old shed, if it had an apology for a roof, with an old hay-rack, sleigh or pung for a roost, was considered ample provision, and the hens were expected to provide eggs and chickens for home consumption, and a generous surplus for market. No thought or provision was made for feeding, except in winter, and then only occasionally, sparingly, and irregularly. To-day a marked change is apparent. The breeder of to-day, first of all provides good, light, warm houses, ample yards, supplied with pure water, with grass in its season, and after ample provision has been made for the health and comfort of his stock, he makes his selection of such kind or kinds as he wishes to breed from, and always buys the best.

In the selection of his stock he has regard to the object sought, whether fancy stock for exhibition and sale, eggs for market, or eggs and poultry combined; and the intelligent breeder goes about this with as much faith in results to follow as he who plants corn. The man who plants corn has no expectation of raising a good crop without tending and caring for it. So with the poultry breeder. He knows that the old starving-out system will not pay, it has been tried and proved a failure, and that only under the best conditions in all respects, will he be morally certain of success. Consequently, he made ample provision for the comfort and health of his stock, so far as house, yards, etc., are concerned. He has got pure blooded stock, and he carefully attends to their wants, gives them a variety of food, and feeds liberally. Thorough ventilation and cleanliness are his watchwords, and he *expects* success.

Poultry raising at first thought seems a very small matter, and of no account commercially, and yet when we take into account the amount of cash received in our State for eggs and poultry sent to Boston in one year, we are astonished at the figures; I am sorry I am unable to give the amount. Then add to this the amount of eggs and poultry consumed in all the cities and villages in our own State, and we have an aggregate so large, could I give the figures, few of you would believe me.

The French have long been noted for their faculty of turning small matters to individual and national gain. It has been said of them that a French family would live sumptuously on what an ordinary American family would waste, thus showing their propensity of turning every little thing to some account. They, to-day, are far ahead of any other nation in the profits realized from poultry, and seem to have carried this saving propensity of theirs into the management of their poultry as well as other matters.

In raising poultry they have always had a definite object in view, and that was, to produce varieties of birds that would for the food consumed, be the most prolific, and when killed and dressed for market would be of good size, and give a small percentage of loss in dressing, and they have succeeded admirably. While American breeders have turned their attention to the production of egg producing birds, as the white and brown Leghorn, which as egg producers are superior to any and all other breeds, the French have endeavored to produce varieties that shall not only be good layers and non-setters, but in addition to these good qualities, they must also combine size when dressed for market; and to-day, if they never produce another variety, the Houdan in its native home stands unequaled, and a positive evidence of their success. This variety has been imported into this country and England, and the same success is expected with it that the French have had. But we must not expect that French birds alone will give us the same success the French have had, but we must have some of the French management to go with them. Already the breed has begun to deteriorate, for the reason that Americans and Englishmen have begun to sacrifice its economic qualities for merely fancy points of color and shape.

Some idea of the importance of poultry raising to France may be given, by stating that England, in 1871, imported from France eggs to the value of over six millions of dollars; add to this the value of eggs and poultry consumed at home—and the French as a people, are perhaps greater egg consumers than almost any other nation—and we get some idea of what poultry raising and the profits resulting therefrom, are to the French people.

Various and many theories have been advanced in regard to space for a given number of birds, some contending that eight or ten could be kept wholly under cover, in a coop 6x12 feet, in two compartments, but I have never known birds to do well in such quarters. From one extreme they have gone to another, and Mr. Wright, an acknowledged authority in

England upon poultry matters, claims that in order to make the business profitable, not more than one hundred birds should be quartered on one acre of ground. In our own country opinions differ, and perhaps we may well accept Mr. Stoddard of Hartford, Conn., as good authority, whose system is a mean between the two extremes referred to, and more especially adapted to the production of eggs than either the English or French idea. Perhaps I may as well say something here in regard to the management of poultry to make the business successful.

In the first place it is necessary to have suitable houses. They need not be fancy or costly. They must be light, dry, warm and free from drafts of air. I have in my mind a case illustrative of the necessity of the last point. A breeder of fancy poultry laid himself out and built a model house, to his mind. He built it two stories high, making a roosting place in the upper story under the roof. There was a large amount of glass in the roof, and in cold weather, (the exhibition season) he warmed the house by fires in the lower story. The result was, the warm air ascended to the upper, came in contact with the glass in the roof, became cold, and descended to again be heated, thus keeping up a continual circulation of hot and cold air. At just the time he wanted his birds at their best, he found them at their worst; for from the drafts of air they were sick with a cold or the roup, and unfit for exhibition. As I have said, it is not necessary to have an elaborate or costly house. No matter how cheaply or roughly constructed, provided it has the requisites for the health and comfort of your birds. I have seen as good birds raised in houses that cost but a few dollars as could be raised in one that cost a thousand. After you get the house, be sure and keep it clean and free from vermin, as no fowl can be healthy and do well if they or their house are infested with lice, as they surely will be if not kept clean. How often we hear people asking, "What ails the chicks?" If they will catch one and examine it, nine times in ten, the trouble will be found to be lice bred from confinement in filthy quarters.

There is another consideration why poultry houses should be kept clean, and that is, the value of their droppings, which if properly cared for are of great value. I have seen it stated, that one bushel of hen manure moistened and thoroughly fined and mixed with fine muck, ashes or loam, was equal to an average load of barnyard manure. No one who keeps a large flock of hens, and has attended to their droppings, and composted it with suitable material, will need advice upon this point.

A word as to feeding. Do not over-feed; remember, fowls require a variety of food and will not do well if restricted too much in their diet. They require green or vegetable food, which can easily be supplied in summer by allowing them a run on grass, and in winter a liberal supply of cabbages; mangolds, or other roots, will be relished by them, and will well pay for the trouble of raising. Fowl require green or vegetable food, and a variety of grain, changing their feed as often as practicable. By over-feeding with grain, especially with corn, they become fat inwardly, and then good-by to eggs. The best rule in feeding, is to feed as long as they will run eagerly for the food when thrown to them, and when they do not hurry to pick up the grain, that is the time to stop—they have got enough. An important point to pay attention to, is to watch your hens, and do not let them get older than you are. When a hen has passed her third laying season her time of usefulness as an egg producer has passed, and no matter how patiently you may watch for eggs, as a rule you will be disappointed. Sort out and kill off the old ones, and supply their places with young pullets, which will furnish you with an abundance of eggs, and at the time of year when they will bring the largest price. I do not propose to give you glittering figures, showing profits to be derived from poultry raising; that all depends upon the skill and good management of the breeder, and we all see enough of this in the agricultural press. One man will say a bushel of corn, costing 70 cents, will keep a hen a year, and she will lay from one hundred and twenty to one hundred and fifty eggs during the same time, which at 20 cents per dozen would give a profit of $1.30 to $1.70 per hen; which perhaps might not be far out of the way when kept in small flocks; but don't keep four or five hundred in close quarters in one flock and expect the same profit per head, for you will be disappointed.

Hens will not do well in large flocks. It has been tried time and again, and always proved a failure. How often you see in your agricultural papers inquiries as to the business of poultry raising on a large scale, and as often read the answer that it very rarely pays, and mainly for the reason that too many are crowded into small quarters. I am satisfied, however, that if you give them plenty of room, with a good run to grass, and pay attention to the seemingly small points in their management, to which I have alluded, you will find the business profitable. There is money in keeping hens for eggs alone. There is money in raising them for the meat. When spring chickens are worth 40 cents per pound in June, 35 cents in July, and 30 cents in August, as they are every year, and will be for years to come, there is money in raising them, when you make them weigh 2½ to 5 pounds each, at four months old. It does not require much figuring to find a profit in this, and it can easily be done. Do you think the prices named, high? I know one hotel keeper who will contract any day to take three thousand chickens during the months named, at these prices, and he is only one of many who would do the same. There is always a market for early spring chickens at high prices, as the market is never overstocked. Then there is money in fancy poultry, just as there is in raising fancy stock of any kind. I have known of a single bird being sold for a price that would buy a good horse. I know one breeder of fancy poultry whose sales for months in succession have averaged fifteen hundred dollars per month. One breeder in our own State, last year made five hundred dollars raising poulty; and he had seventy-five dollars for a single bird. The breeder who understands the requirements of his birds, and meets those requirements with proper care and attention to his stock, and combines in his business, breeding for eggs, meat, and fancy for exhibition and sale, will find, I believe, a larger percentage of profit upon his investment than in any other branch of stock raising in our State.

One branch of poultry raising I have not spoken of, which I believe is the most profitable of the whole poultry tribe. I allude to turkeys. They require but little attention, and if a good breed, attain large size and are always in demand. The first two or three weeks it is well to look after them, and if early in the season, keep the little chicks from the wet grass and sheltered from rains; but very soon, if left to themselves, will take care of themselves, and no attention need be paid to them till fall, when you want to feed and fit them for market;—for cost of feed and care, they pay better than any poultry I can raise. Two of my turkeys last spring went out in the pasture, laid their eggs and hatched their chicks, and were two weeks old when we first saw them. They never came to the house and there was never a crumb fed to them till October, and these young ones were as large, and in as good condition as those hatched at the house and well cared for early in the season, and I sold them alive (twenty in number) for two dollars each, and think it paid.

Now, after this random talk, I will say, if any of you propose to raise poultry extensively, or more than ordinary farmers raise, ask yourself if you know the habits and requirements of the kind or kinds you propose to raise. If not, don't do it; but first acquaint yourself with the business, and the best way to do this is to commence in a small way, and as you learn their habits and wants, you can increase your stock to any amount your circumstances will permit, always remembering that plenty of room, and in winter warm rooms, variety of food and perfect cleanliness, will insure you healthy stock, and plenty of eggs, consequently good pay for your care and feed. One other thing. Don't keep too many kinds. Start with the best stock of whatever breed or breeds you keep, and so manage and care for it, as to improve it and make it better year after year, and you will always find customers who will purchase for breeding purposes, and pay fancy prices. No man can afford to raise or keep poor stock. It costs as much to keep an ill-bred animal as a good one, and when an ill-bred scrub will not sell at any price, a good one will command a good price.

Any farmer can keep a stock of poultry, larger or smaller as his circumstances will permit, and hardly know or feel the cost, and if he has children as every farmer is supposed to have, and they are encouraged to do so, will take kindly to it, and care for it, and if allowed a share of the cash received for eggs and chickens sold, they will be sure to keep the hens laying, and you will be agreeably surprised at your income annually from this branch of stock-raising.

THE CULTURE OF FLOWERS.

By James A. Varney, North Vassalboro'.

I am fully aware that the subject assigned to me this evening, embraces too broad a field to admit of anything like a full and complete treatment in the time allotted me. I shall endeavor, however, to present some practical hints that may serve to enliven our interest and tastes in this interesting branch of horticulture.

In no country in the world, probably, has such rapid progress been made in the art and science of horticulture, as in our own during the last few years. We deem it a happy indication that the love of flowers is increasing every year, and that the interest in their cultivation is becoming widely disseminated among all classes. No longer does the old idea prevail, that owners of large estates, or the wealthy alone, can afford to cultivate flowers. To-day the cheerful and refining influence of flowers is felt beneath many an humble roof. Here in the lowly cottage as well as in the costly and elaborate conservatory of the rich, their beauty and fragrance are justly appreciated, and though starting from some rude box or pot upon the window-sill, they are none the less a source of constant joy and sunshine. Few people among us are so poor as to be deprived of their companionship.

The days when the prosperous farmer could be satisfied with his broad acres and well filled barns; his numerous flocks and herds, while his family dwelt in a hovel, with little of comfort or convenience within, and absolutely nothing to please the eye in its surroundings without, may well nigh be considered among the things of the past. Convenience and coziness, permanence and prettiness, pleasant situations and pleasant surroundings, all enter into the account in appraising the real value of our home. Our homes! How dear that spot should be to all, in city or town, in wealth or in humbler walks in life, for out of it spring the issues which are to exert a lasting influence over all our subsequent life. Father, mother, son and daughter, each in their appointed sphere, form a component part of home, and contribute individually to its weal or woe. Parents sometimes forget that once they were children, often to the utter exclusion of all that tends to strengthen the ties of childish endearment to the sacred name of home. There is little music for the boy in hoeing corn or potatoes from the rising to the setting of the sun, and he becomes weary with his hoeing. You had forgotten, perhaps, or never learned, that an hour with the guitar or violin would have helped him out with an extra row of corn. He loves his pet birds or flowers, but those, perhaps, are hidden away in some nook or corner unobserved by you. Aid him in caring for these a few moments occasionally, and see then how lively the cart and the plow will speed over the farm the balance of the day. Give the children a nice croquet ground, plenty of well prepared space for a flower garden, everything neat and tidy about your premises, and my word for it, you will find them less anxious to get away from the dearest spot on earth—home. I trust I shall be pardoned here for reference to some personal recollections of the past.

When a boy, I remember that my father caused the ample front yard to be plowed, and instead of planting out shrubbery and flowers, it was filled with bush beans. I have not been partial to beans since. If flowers had been planted in that yard instead of beans, who can tell but I might now be able to eat as many of them as—Mrs. Partington!

Another reminiscence of my boyhood days, and I will proceed to the more direct text in hand. I was sent on horseback on an errand, some 35 or 40 miles away. It was a hot, sultry day in the latter part of the month of June, and after riding a long distance through a wild, woody section, I came out to a log cabin. Being thirsty, I dismounted and proceeded to the cabin for some water. Beside the narrow pathway were two pretty beds of common flowers, their little blossoms shining in the sun, and seeming to say to me: "This is the way to our humble, happy home, walk in." A rap at the open door brought out a smiling lass of some twelve or fourteen summers. She bade me enter and be seated, while she ran to the spring for some fresh water. Like many a Miss(?)taken youth before, I made a proposal in haste and was as hastily rejected. It was to go and get the water myself. But I was left to look at the inside of a log house. The mother and a little brother of the pretty maid of the spring were present. Everything about the premises was of humble design, but exquisitely neat and clean. Two small sized window sash furnished light for this humble cabin, in one of which sat a box containing a Hydeangea Hortensis in full bloom, and one or two smaller dishes of flowers. The young Miss called the little boy, washed his face, combed his curly locks, and after printing a sweet kiss upon his cheek sent him away to school. Well, I confess it, I half wished I might be sent to school too. Night approaching, found me in the highway in front of a farm-house where I had been instructed to tarry over night. The yard in front of this well-to-do farmer's house was literally crammed with last winter's bod-sleds and long sleds, old carts and hayracks, a tumble-down corn-pot, the remains of an old-fashioned leach tub, cords upon cords of wood from old trees just as they were felled in the forest, down to the half decomposed pigsty that leaned against an old appletree in the corner opposite the corn-pot just referred to. I do not now think of half of the names of the things that adorned (?) that front yard; enough, however, to make a first-class fire, not including the building. I was plucky for one of my age, as you may well judge, to find my way through all this incongruous mixture to the door of the house. A few raps with my knuckles failed to attract the attention of the inmates, but a long and loud one with the butt of my whip stopped the continued buzzing of a number of spinning-wheels, and brought a strapping, great long, barefooted girl—lass I should say—to the door. I introduced myself as well as I could, all the while wading about in a general scramble of pigs, turkeys, geese, and ganders too, hens, chickens, and what not; all making a grand charge upon the same door with me—I forgot to include several pet lambs in the above hash. This was a wealthy farmer's home. Four big daughters, all barefooted, and all spinning. They were corn fed, looked very strong and healthy, and promised much of endurance, but little of refinement and culture. The inside of this home compared well with the outside. What a home! Is there now, anywhere in Maine, such an apology for a home? If so, I would like to send them a copy of this paper, together with a copy of my catalogue of fruits and flowers, to whom I would make a special offer to furnish them with a stock of flower seeds gratuitously—provided they will put fire into the front yard, at a proper time, and plant flower seeds on the ruins.

I do not propose to enter the field of landscape gardening, or the laying out of extensive flower gardens, for those in want of instruction in this direction, will find many publications treating these subjects in detail. Let me say, however, first of all, look to the proper preparation of the soil as the basis of the successful cultivation of flowers, as in all horticultural operations. If you have a stiff, clayey soil, you have probably beneath it a hard clay subsoil. Let this be well underdrained, worked deep and fine with the plow or spade, or both, and well enriched. If you have a sandy loam, with a coarse sand or gravel beneath it, there is less necessity for underdraining. If so light and sandy as to be liable to suffer with drought, work into it a liberal supply of clay and muck, with your dressing. As a rule, there is little fear of making a flower garden too rich. Aspect is of minor importance, provided plenty of sun and air is obtained. Avoid too much shade, and grounds where the soil is crowded with roots from adjacent hedges and trees, for these are continually extracting from the soil those elements essential to the plant growth. In most cases in rural towns, a convenient and attractive location may be found, and if it be only a small one, well arranged and properly cultivated, is far preferable to an extensive one devoid of such care. In the arrangement of the flower garden very much depends on the selection of varieties. For the want of a better knowledge of the kinds of plants and flowers best adapted to our climate, and best suited to our wants, the amateur often meets with a most serious repulse at the onset. Too often is he misguided by the glowing descriptions of plant and flower in the catalogues now sown broadcast over the land. I do not regard the distribution of these documents as a public calamity, neither would I be understood to say that they do not contain very many useful suggestions, and much practical information; but I would say, that many a worthless thing is made to look well upon paper, as some of us have learned to our regret.

Any of these farmers can tell the beginner what crops are most safe and profitable to plant, and the kinds of tools best adapted to his particular uses. Let him rely solely upon the advertisements of sellers of agricultural seeds and tools, especially if they come to him from some distant locality, and he will reach the conclusion that these farmers know but little, to say the least. It is safer, then, to rely upon the opinions and experience of your neighbors, rather than upon the assertions and recommendations of those whose use of the English language is only guaged by the quantity and variety of stock they put upon the market. A reliable seedsman in Maine is of more value to you than one elsewhere, for the reason that he is supposed to understand the wants of the people better than a stranger, and for the additional reason that it would be folly, only, for him to sell you stock of no merit. This rule will hold good in the general sense. If you are not posted with regard to the kinds of flowers and plants with which you wish to produce certain results; or, to be better understood, if you wish to plant flowers on a given space of land, and are unable yourself to select the kinds and quantities most desirable, then take the advice of some good gardener, or your nearest reliable florist, in preference to reading up the catalogues to make your decision by. This of course is meant more particularly for amateurs, though the most experienced will yet find something he had not learned. The most of our country homes have been located with little regard to ornamental surroundings and adornment, so that it now becomes the only alternative to improve and beautify the grounds about the dwelling as best we may.

The vegetable garden takes first rank, too often, in point of location, while the few flowers in cultivation are crowded into some out of the way corner, or beneath the shade of the dwellings and trees. Now let the vegetable garden fall to the rear, and after locating the walks and drive-ways to the house and stable in the best and most convenient localities, then arrange the flower garden, or neatly cut your flower beds in tasteful and symmetrical designs, in the surrounding lawn. And just here, I wish to remind you that the lawn must be kept neatly shorn, or the effect of the choicest arrangement of beds and flowers are most seriously impaired. Once in two weeks, at longest, let the fine grass be clipped in all well kept grounds. Make the entire surface of the lawn, and the edges of all the foot and carriage ways, even and smooth, so that the lawn mower or scythe will cut close and even. Are there spots about the premises infested with noxious weeds, choking out the grapes? Uproot them, grade and smooth the surface, roll in a plenty of grass seed, and after a little time you will be well repaid for the effort. I would not advise the planting of beds of flowers in the lawn, unless you are prepared and *decided* to keep the grass closely cut as above noticed. If this is well done, and you have been successful in the selection of flowers and arrangement of beds, in no other manner can a finer effect be produced. Many of you, doubtless, noticed at the Centennial Exhibition those charming beds of plants, leading out from the west end of Horticultural hall. Some of the most beautiful among them, were composed of common foliage and bedding plants adapted to our climate, and easily obtained, such as Golden Feather (Pyrethrum), Alternathera, Colens, Centaurea, Achyranthes, Calladium-Esculentum, Canna Stabria, etc.

Where beds are cut in a newly sown lawn, the edges of the grass around them should be well and firmly sodded with turf cut a foot in width and two inches in thickness. With this style of beds it is not necessary to have any walks around them. A very pretty edging for such beds is golden feather, the bright golden foliage forming a striking contrast with the deep green of the surrounding lawn. Alternathera, bar, Thyme, or Sweet Allysum, make a pretty, low edging, and Centànceas if taller plants are desired. There is a wide difference in tastes, as to the most desirable modes of massing flowers in open beds as above. Some prefer to mingle distinct colors of foliage, plants, and different varieties of plants, in the same bed, in groups; others a single kind only. When different varieties are used, care should be taken to place the taller ones in the centre, interspersing the colors so as to form an agreeable contrast in shades.

In border beds, i. e., where they are to be viewed from one side only, the tallest should be placed in the background, so that the shorter ones may not be hidden. Another very effective and desirable method of planting, is termed ribbon gardening, and consists in planting distinct colors in foliage or flowers, in lines around beds of any form, or upon the edges of walks and drive-ways. For a ribbon bed beside a walk, Achyremthes Gilsonii, and Centancea Gymnocarpa, the former a beautiful carmine leaf and stalk, the latter a downy white plant, are very pretty and great favorites. Cut the ribbon bed three feet in width, sink the edges two inches below the surface, and raise the centre four or six inches above. Plant two rows of Achyremthes upon the outside, and one row of Centancea in the centre, serrated at a distance of fifteen inches from plant to plant in all directions. Colens of different shades makes a beautiful ribbon border or ribbon bed. In massing flowers, care should be taken to plant only those which have showy foliage, or are of free blooming habit, so that at no time during the season it shall fail to be a thing of beauty. These should also be so thickly set as to entirely cover and hide the surface of the ground. There are many varieties of plants that are suitable for massing, or for mixed beds. Bright scarlet geraniums, either double or single flowered, are admirably adapted to this purpose. We give preference to the single flower, as it is a more profuse bloomer, provided you obtain the best varieties. Petunias, phlox drummondii, pansies, portulaccas, stocks, helitropes, zennias, asters, candytuft, dianthus, nasturtium, sweet peas and verbenas, each are of various colors, and are also all suitable to plant in like manner, with pleasing effect.

When beds of one kind only are used they show to much better advantage if raised a few inches in the centre. Most of the above named varieties will succeed well if grown from seed; others will prove more satisfactory if procured from the florist. Verbena seed, for instance, will often disappoint you, and must be started in heat early, in order to produce bloom a long season, and a large percentage will prove of poor colors, while a basket or two of choice plants from the florist should never fail to please you. Sow verbena seeds in shallow boxes, in some light, sandy soil, or leaf-mold, covering them one-twelfth of an inch in depth, and in the absence of the propagating-house or hot-bed, place them in a sunny window, or over fire heat, maintaining as even temperature and moisture as possible. Transplant in similar soil, in about four weeks, about two inches apart. Plant out thickly, say eight or ten inches apart, so as to pull three-quarters of them when they show bloom. Good thrifty verbenas will cover the ground when set from two to three feet distant. The larger part of plants grown from seeds, do better when sown in a hot-bed or seed-box in the house, and transplanted. In this way tender annuals and vegetables of all kinds may be forwarded some weeks earlier than if sown in the open air. There are a few varieties of flowers, however, that will do best when sown where they are to grow, as candytuft, convolvulus, larskspur, mignonette, sweet pea, (sow these last two inches deep), poppy, portulacca and some others.

It is a difficult matter to give directions how to propagate all kinds of plants by seeds, in a paper like this. The farmer understands that it is time worse than lost to plant his corn and beans at the beginning of spring planting in this climate. He waits until the advancing season has produced the proper humidity and temperature of the soil and atmosphere before he plants these. So, too, the florist has learned, that if amaranths, zinnias, portulaccas, etc., are sown while the soil is yet cold and damp, they will not germinate readily, and if they do, will produce only feeble and sickly plants. He waits until the thermometer indicates an average of 55° or 60° in the shade, to obtain a healthy stock of these plants. Again, if panzy, calceolaria, primula, or cinneraria seeds be sown in the hot and dry weather of July or August, disappointment—no, failure is the result. These he will sow in early spring, or better, in the middle of September to October 1st. The want of knowledge of these facts is often the real cause of failure, while the amateur has been inclined to place the fault at the door of the seedsman. As good a general rule as I can give, to cover flower seeds in the garden hot-bed or window, is about twice their own depth, in light, sandy soil, or leaf-mold from the woods, sifted on through a fine sieve, gently and evenly pressing the surface to prevent the air from drying up the seed. Seedings are soon ruined if neglected or left to suffer for moisture; a fine rose sprinkler, or the fine spray from a wet brush-broom answers well for this purpose. In transplanting from the seed-box, choose a late hour in the day, and if the season be dry leave a depression around the plant, water well, and afterward draw in light soil to prevent the baking of the surface. In watering large plants, also, it is well to do this, always wetting thoroughly, so that the roots may drink a full supply. This is much better than frequent partial watering, which serves to crust over the surface, while the roots of the plant are still thirsting for water. Withhold water, then, until you see that your plants are thirsty, then give a liberal supply, which will be sufficient for several days, even in a dry time. This matter of watering plants deserves further notice. It is a subject that requires much study and careful attention, more especially in the cultivation of pot flowers. More plants are ruined by the improper use of water than from all other causes combined. Place a calla lily, or a lobelia in a tightly corked pot, or keep the pots submerged in water, and they will flourish and blossom profusely. Withhold water from these, as you would treat a cactus at this season of the year, and they would become sickly and show no bloom. Place any other of the long list of house plants in water in like manner, for twenty-four hours, and they are ruined beyond recovery. Now, so long as the soil in your pots looks damp and feels damp by the touch of the finger, give no water, though it be for a week, or a month, even. But a few weeks since I sold a lady some plants from the green-house, among them a Rex Begonia and some primulas. Thinking it might do no harm to volunteer a word of caution, I said be careful about watering these. "Oh, yes," said she, "I will water them well every morning and evening with warm water; you do this don't you?" "No," I answered, "once a week, probably—referring to the two kinds named—and with water from the very bottom of this well," laying my hand upon the pump; and continued I, "if you should water these plants as you have said, they would die within one week." So, my hearers, you will now infer that I am not particular about the temperature of water for my plants. Such is the fact; and if you have any doubts about growing healthy stock with the use of water at just 40° Fahrenheit, go with me and I will convince you, for our houses are full of such. If I wished to force a calla into bloom, I would give it hot water freely.

I am aware that nearly all the writers on floriculture recommend these two things as being essential to healthy plant growth, viz: rain water, and temperature the same as that of the atmosphere in which they grow. These may both be well enough, but in the absence of both of these conditions for several winter seasons in succession, I have clearly demonstrated the fact, to my own satisfaction, that neither of these conditions are absolutely essential to success. Of course, plants grown in a dry and over-heated atmosphere in the dwelling, will require more frequent waterings than is necessary in the moist and humid atmosphere of the greenhouse. It only needs a little careful, patient watching, to understand the wants and necessities of most of the plants we grow. Indeed, they will tell us what they desire, if we will but listen and hear. If it is sunlight they wish, you will find them turning toward the side from whence they catch the sunbeams, and eagerly stretching forth their shining leaves for more light. If satisfied with their lot, they will remain at ease and seem contented. When supplies of water and other plant-food fails, their leaves begin to wither and fade; they reach down and droop till relief is found, or lie prostrate in death upon the dry and parched earth.

HOP CULTURE.

By Thomas Reynolds, Canton.

The hop is a vine with a perennial root from which spring up numerous annual shoots forming slender stems, angular and rough to the touch. These stems climb spirally upon poles to the height of twenty or thirty feet. The vines produce numerous arms or shoots from six to forty inches in length, upon which are grown clusters of cone shaped burs or catkins. It is for these catkins which grow only on the female plant that the vine is cultivated. They consist of the scales, stems or nuts, and lupuline grains. The lupuline is an aromatic, resinous substance of yellowish color which covers the scales at their base, and which constitutes about one-eighth of the weight of the dried catkins, and contains the greater portion of the valuable qualities. The strength or richness of the hops depends upon the amount of lupuline or pollen which it contains.

The hop is found wild in the Eastern States, and on the banks of the Mississippi and Missouri, also in several European countries. Its cultivation in Germany can be traced back to the ninth century. Great Britain first learned of its qualities of preserving beer from fermentation and imparting an agreeable bitter flavor to the liquor, about the year 1524. That country now cultivates the hop very largely and to a good degree of perfection. The county of Kent alone, has thirty thousand acres appropriated to hop growing.

In the United States its cultivation is of recent date. A few farmers in the State of New York were the first to introduce hop growing; and as the German immigrants increased in this country, the demand for their much loved beer also increased. To keep the beer from fermenting, hops were necessary, hence their cultivation extended into New England, Ohio, Indiana, Illinois, Wisconsin and Iowa, as well as California and Oregon. The sunny slopes of hills which are well protected from severe west and northwest winds, where the soil is light and loamy, or gravelly with a dry subsoil, are the most desirable situations for hop gardens.

In setting a yard, three or four seedlings should be placed in each hill, and the hills and rows of hills should be from six to eight feet apart. After the yards or hop gardens have been set one year, each hill should be provided with three or four poles fifteen to twenty feet high. The ground for hop-growing should be as carefully prepared as for a vegetable garden. It should be frequently cultivated and kept free from weeds and grass. Plants do not produce a full crop till the third year after planting, and their production is always precarious, as they are subject to blight from mould or rust, and from the devastation of the hop louse, this insect not unfrequently destroying half, or even three-fourths of the the entire crop. The fruit should remain on the vine till it is fully matured. When ripe, the hops will be of a brownish color, and the lupuline grains will have concentrated about the hop stem. In gathering the fruit each hop or stobile should be picked off by itself. All foreign substances, such as leaves, stems and dirt, should be carefully kept from the hops. Pickers should reject all burs and immature hops, and those that have trailed upon the ground; for by mixing these with the mature hops, the value of the stock will be greatly impaired. The quality and flavor of the American hop is nearly if not quite equal to that of England or Germany, when the fruit is allowed to ripen, and is then gathered with care and is properly cured. The present year has clearly shown to the American hop growers the disadvantage of slovenly picking of immature fruit. The German crop was short, and this country alone could have used all our surplus at *full prices* had the fruit been allowed to mature and been properly picked and cured; while she now refuses our hops *at any price.* Hops that to-day (Feb 9th,

1877) find a *slow* sale at 15 to 18 cents, might, with suitable care, have been finding a ready market at 30 or 35 cents.

After the crops have been well picked, then they must be carefully and properly cured. Nature may have done her part well, and the grower may have secured a large, cleanly picked crop of superior quality, yet by inexperience in the art of curing, the hops may be ruined, either by over-drying or not drying them enough. Hops that are highly dried and scorched, lose their rich flavor and aroma, while those insufficiently dried are liable to heat in the bale and become utterly worthless. If the hop is allowed to get ripe on the vine, there is no use of sulphur in curing. It is important that hops be put up in the best possible manner. Shaggy, loosely packed, irregular shaped bales, are almost invariably rejected by the inspector.

There are several patent presses on the lever plan, now in use, but the one which meets with the most favor is the Waterville or New-York press, which gives bales of uniform size, namely: 4½ feet in length, 2½ feet in width, and 18 inches thick. Bales of this size should weigh as near 200 lbs. as possible. Small or slack pressed bales do not command full price, while bales that are compressed so as to exclude the air entirely from the hops, are liable to heat. The sacking in which the hops are baled should be 22 to 24 ounces in weight to the yard. None but the best three-ply twine should be used in sewing the bales. The most favorable time for baling is on a rainy day, as the hops are then more pliable and less likely to break up. Men should never be allowed to "tread down" the hops in the press, for by this means they break up the hops and the pollen and aroma are lost. Make the sides of the presses high enough to hold 200 lbs. without the "stamping" process. In sending hops to market each bale should be plainly marked. No grower should be without a stencil plate bearing his full name or the initials of it. In no case should kerosene oil be used. A large amount of hops have been rejected in the London market on account of the use this oil with lampblack as a marking material.

The unpleasant odor of the oil spoils the natural flavor and aroma of the hops. Turpentine with lampblack makes a very good marking material.

I give here a table which shows the relative production of hops in the largest brewing countries of the civilized world:

COUNTRY.	Production in Pounds.	Consumption in Pounds.	Production more (†) or less (*) than consumption in Pounds.
Germany	47,711,100	32,150,000	† 15,561,100
England	38,409,000	60,000,000	* 21,591,000
Austria	9,253,200	10,000,000	* 746,800
Belgium	9,750,000	1,500,000	† 8,250,000
France	4,800,000	4,800,000	–
Rest of Europe	845,400	2,500,000	* 1,654,600
Total Europe	110,768,700	110,950,000	* 181,300
North America	30,000,000	–	–
Australia	300,000	20,000,000	–
Total	141,068,700	130,950,000	† 118,700

In Germany the production and consumption of hops is distributed as follows over the various countries forming the Empire:

COUNTRY.	Consumption in Pounds.	Production in Pounds.	Production more (†) or less (*) than consumption in Pounds.
Prussia	5,940,000	13,000,000	* 7,060,000
Bavaria	21,256,600	8,000,000	† 13,255,600
Wurtemburg	7,365,900	2,800,000	† 4,569,500
Baden	2,631,000	1,000,000	† 1,631,000
Elsass & Lothringen	9,000,000	1,500,000	† 7,500,000
Rest of Germany	1,515,000	5,850,000	* 4,335,000
Total	47,711,100	32,150,000	† 15,561,100

From this table it will be seen that the production of hops in Germany over the consumption averages about 15,561,100 pounds per season, which are principally exported to other countries. From other statistics we learn that the actual surplus of exports of hops over the imports, amounts to 15,230,000 pounds.

During the year 1876 there were shipped from the United States to Europe, 42,896 bales of hops. Of this number there were shipped from Boston about 1000 bales, from Philadelphia, San Francisco, Portland and other parts there were shipped from 10 to 1,500 bales, and the balance, or over

40,000 bales, were shipped from New York. The crop of hops last year was variously estimated at from one hundred and thirty to one hundred and fifty bales. Of these some 43,000 bales were exported, and about 10,000 bales were unsold when the new crop came off. This would leave from 77,000 to 97,000 bales as the amount taken by the brewers in the United States. The crop of 1876 was nearly or quite as large as that of 1875, but our brewers are not buying half as many as they did last year; so the surplus this year will be very much larger than it was a year ago.

I introduce here a useful table, showing the monthly receipts and exports of hops at New York for a series of years, also the exports from the United States and the comparative ranges of prices of domestic hops in New York a period of seven years, from 1868 to 1874 inclusive:

MONTHS.	New York.				United States.	
	Receipts, 1873.	Receipts, 1874.	Exports, 1873.	Exports, 1874.	Exports, 1873.	Exports, 1874.
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
January..........	2,167	2,484	711	61	717	726
February.........	1,350	13,071	2,609	11	2,915	11
March............	1,251	1,089	31	78	31	78
April............	393	702	1,469	114	1,469	114
May..............	610	525	1,865	85	1,865	85
June.............	251	1,490	921	15	921	20
July.............	465	1,029	169	5	193	269
August...........	189	1,108	14	1,318	25	1,318
September........	1,521	2,894	169	1,446	169	1,446
October..........	4,711	11,515	149	4,499	149	4,899
November.........	2,637	6,344	178	2,402	178	2,769
December.........	2,649	5,337	5	2,810	5	3,380
Total............	18,400	47,788	8,290	12,844	8,637	15,115

1875.	New York.		United States Exports.	
MONTHS.	Receipts.	Exports.	1874.	1875.
	Bales.	Bales.	Bales.	Bales.
January............	2,789	1,478	726	1,478
February...........	746	652	11	915
March..............	1,580	528	78	743
April..............	554	272	114	272
May................	613	10	85	38
June...............	350	16	20	16
July...............	826	30	269	66
August.............	694	366	1,318	659
September..........	3,912	688	1,446	688
October............	13,700	6,638	2,899	6,638*
Total, bales.........	25,764	10,678	6,966	11,513

*Includes exports from port of New York only.

COMPARATIVE RANGES OF THE PRICES OF DOMESTIC HOPS IN NEW YORK.

STATES.	1868.	1869.	1870.	1871.	1872.	1873.	1874.
	per lb.	per lb.	per lb.	per lb.	per lb.	per lb.	per lb.
New York.....	20 *a* 60	6 *a* 12	20 *a* 27	8 *a* 12	25 *a* 85	25 *a* 49	25 *a* 45
Wisconsin.....	52 *a* 65	5 *a* 9	16 *a* 23	5 *a* 9	25 *a* 60	25 *a* 48	25 *a* 45
Michigan......	20 *a* 50	5 *a* 9	15 *a* 22	5 *a* 9	25 *a* 60	25 *a* 48	25 *a* 45
Ohio...........	20 *a* 45	5 *a* 9	15 *a* 22	5 *a* 9	25 *a* 60	25 *a* 48	25 *a* 45
Yearlings.....	15 *a* 40	2 *a* 5	6 *a* 10	2 *a* 4	25 *a* 60	....	......
Olds...........	10 *a* 25	1 *a* 4	2 *a* 4	1 *a* 3	10 *a* 30	....	......
Foreign.......	35 *a* 65	....	....	....	60 *a* 80	....	18 *a* 40

MONTHS.	1874.				1875.		
	Bavarian, per lb.	English, per lb.	Eastern & Western, per lb.	California, per lb.	State, per lb.	Eastern & Western, per lb.	California, per lb.
January.....	35 *a* 40	28 *a* 37	25 *a* 35	40 *a* 44	35 *a* 48	35 *a* 45	45
February....	35 *a* 40	28 *a* 37	25 *a* 35	40 *a* 45	33 *a* 45	32 *a* 42	42
March......	35 *a* 40	28 *a* 37	25 *a* 35	40 *a* 45	31 *a* 40	28 *a* 38	38
April........	27 *a* 33	23 *a* 27	26 *a* 30	31 *a* 39	30 *a* 39	28 *a* 36	38
May........	25 *a* 30	20 *a* 25	25 *a* 30	26 *a* 36	30 *a* 40	28 *a* 36	34
June........	25 *a* 30	20 *a* 25	25 *a* 30	25 *a* 35	30 *a* 37	28 *a* 33	30
July........	24 *a* 29	19 *a* 24	24 *a* 29	24 *a* 33	......	......	......
August......	20 *a* 25	18 *a* 22	20 *a* 25	20 *a* 27	......	......	......
September...	20 *a* 25	18 *a* 24	32 *a* 39	20 *a* 29	......	......	......
October.....	......	18 *a* 25	39 *a* 45	35 *a* 42	......	......	......
November...	......	18 *a* 25	38 *a* 45	40 *a* 47	......	......	......
December....	......	......	41 *a* 47	44 *a* 49	......	......	......

The cultivation of hops in Maine is principally confined to the western parts of the State. They are cultivated in several different counties, but the most extensively in Oxford county, almost every town in the county containing more or less fields.

The cultivation of hops in Oxford county was introduced some forty years ago into Canton on the Androscoggin river, and since then the cultivation has extended up and down the river quite rapidly, and the interest in hop growing has continually increased. The past year (1876) there were raised (as nearly as can be estimated) about 400,000 pounds of hops in the State, or about 2,200 bales; which at 25 cents per pound would amount to $100,000. There has been sold and sent into the market about 1850 bales. Those that have been sold netted the growers from 25 to 30 cents per pound; the remainder, or about 350 bales, yet remain in the growers' hands.

One of the most useful properties of the hop is its keeping quality. It is this, largely, which gives it its value in commerce, and in the practical uses to which it is put. From the best authority, I feel confident in making the statement that Maine hops possess this quality in an unusual degree, and will keep longer and retain their aroma fresh and unimpaired to a greater degree than the hops grown in any other section of our country. This being true, it gives greater importance to Maine as a hop producing region than it would otherwise possess.

Since writing the above, I have received the following from Prof. Levi Stockbridge of the Massachusetts Agricultural College, in answer to inquiries addressed to him:

"I have applied the facts stated by you (and I have also received the identical estimate from several gentlemen in Western New York) to my calculations on the chemical constituents of the hop plant, and feel confident the following formula will be an exact fertilizer for the production of hops: a compound composed of 25 lbs. of nitrogen, 39 lbs. of potash and 18 lbs. of phosphoric acid, and that amount of these elements should produce 1,000 lbs. of dried hops. I have had no opportunity to try or prove it. The first year's use must be considered experimental—but I have no fears of the results."

THE MARGIN OF PROFIT.

BY PROF. M. C. FERNALD, MAINE STATE COLLEGE, ORONO.

The faithful laborer is everywhere worthy of his hire; whether the work be of the hand or of the brain. In proposing to enter upon any enterprise or pursuit, it is legitimate to consider what are the prospects of reward. By this standard nearly all our plans are arranged; in relation to it most of our acts are performed.

If the vocation of the farmer does not yield a fair return for the work of his hands, for the thought, the care, the economy, the skill which he exercises, it is a vocation not worth the following. I am not willing, however, to concede, for I do not believe that agriculture well conducted is not a fairly remunerative employment, not only for the man who labors for wages, but for him who owns a portion of the soil and directs the operations upon it. In our own State, and in sister States, there may be, doubtless are, idle, shiftless, worthless farmers, who do not deserve and do not achieve success; but to the honest, earnest, industrious cultivators of the soil, it will hardly be denied, that nature is fairly liberal with her bounties, and taking the years together, that the rewards of intelligent and well directed industry in this vocation are incomparably more reliable than in most other pursuits. Nevertheless, it cannot be expected that any thoughtful man will enter upon this calling, as he will not upon any other, without considering the chances of profit and of loss. No man engaged in it should be content not to know whether he is gaining or losing, and just where the margin of profit is to be sought, and the means by which it can be secured.

It is a question of weighty import to the farmer, "Wherein can I find the amplest returns for my diligence, my painstaking, my toil?" He says, "I now practice all homely economies; my expenditures I can hardly make less. How shall they be provided for?" If I read aright the lesson which science at the present day is endeavoring to teach to the agriculturist, it is, that his highest success lies in the line of a *more intensive culture.* If the expenditures cannot be made less, the returns must be made greater. Poor farming does not pay; it never has paid, it never will pay. By high cultivation only, by the liberal feeding of plants and of animals, can satisfactory results in farm economy be obtained.

Before entering upon any development of this idea, I desire to call attention to one error in farm practice which widely obtains—which underlies many other errors—and is the basis of much loss, but which the progressive farmer is not slow to correct. I refer to the entire omission of accounts with the farm, by which can be determined whether the business is a paying one or the reverse. Am I not safe in assuming that not one farmer in fifty knows by actual and trustworthy records, how much his business is paying him, or whether it pays anything or not? The manufacturer of cotton or woolen goods determines to the tenth of a cent the price per yard at which his goods must be sold to cover the cost, or yield any desired margin of profit. A reckless system of accounts, or no accounts at all, would be ruinous to him. The merchant, whose books should not indicate approximately, at least, the condition of his affairs, would be deemed unsafe in business transactions, and as guilty of inviting financial disaster. With him the character of the book-keeping may determine between success and failure.

In like manner, even if in a less degree, are careful records among the essentials to success in farm life. Not only should accounts be kept with the farm as a whole, but with every department of it; with the wheat field, the corn field, the potato field, the mowing field; with the swine, with the sheep, with the herd collectively, and with the individual members of it. Thus, only, can be determined what crops, if any, are cultivated at a loss, and what will give the largest margin of profit. Thus, only, can be determined what animals it may be advantageous to retain, and what to pass over to the butcher. Thus, only, will the farmer conduct a business somewhat intricate in its details, on a safe and reliable basis. For illustration, I submit records made at the farm of the Maine State College, showing the milk producing and butter producing power of ten of the cows. Those marked "half Jersey" and the one marked "half Shorthorn" are also half native. The cow marked "native" is regarded as having in her veins a strain of Jersey blood, although in her appearance there is nothing to indicate it.

	Lbs. milk 10 m'ths.	Lbs. butter.	Per cent. of cream.	Period dry.
Cornelia, Shorthorn	7933 ÷ 25	= 307	11	3 months.
Duchess of Lakeside, Shorthorn	4430 ÷ 24	= 185	10.5	4¼ "
Hebe, Jersey	5011 ÷ 25	= 200	12	⅓ month.
Pride of Lachine, Jersey	4186 ÷ 20.6	= 203	21.2	1 "
Isabel, Ayrshire	3593 ÷ 30.5	= 118	10	2¼ months.
Olee, Ayrshire	6838 ÷ 28.2	= 243	11	1 5-6 "
Maggie, half Shorthorn	7220 ÷ 28.2	= 256	12	2⅔ "
Dinah, half Jersey	5494 ÷ 28	= 197	11.2	1⅓ "
Topsy, half Jersey	6650 ÷ 17.1	= 389	14	2 "
Johnson, native	7393 ÷ 19	= 389	15.5	1⅓ "

Although the relative feeding capacity of the different cows is not shown, yet a moment's examination of the table leaves one in no doubt as to what cows in the above list can be retained for milk or for butter, with advantage, and what cows not yielding a profit in their products, are valuable only for beef. It will be observed, moreover, that the percentage of cream is no sure index of the amount of butter which a given quantity of milk may furnish, so much more uniformly do the butter globules supplied from the milk of some cows break and yield their contents, than those furnished by the milk of other cows or other breeds of cows.

In seeking for the largest margin of profit in the pursuit of agriculture, it has been stated that the farmer's highest success lies in the line of a more intensive culture. This truth will become more evident from an examination of nature's agency and man's agency in the production of crops.

A chemical examination of plants reveals the fact that they are composed of two kinds of materials, an organic and an inorganic portion. The organic portion of plants, as is well understood, consists chiefly of carbon, oxygen, hydrogen and nitrogen. The first named of these elements, carbon, is abundantly supplied to plants from the carbonic acid of the atmosphere, through their leaves. Oxygen and hydrogen are furnished in the form of water, through the roots of plants. The remaining organic element, nitrogen, although constituting about four-fifths of the atmosphere, is never in appreciable quantity, if at all, supplied to plants directly from this source, but is furnished from the compounds of nitrogen with other elements, chiefly from ammonia composed of nitrogen and hydrogen, and from nitrates whose source of nitrogen in most cases is nitric acid composed of nitrogen and oxygen. The nitrates and ammonia are taken into plants from the soil by means of their roots.

"From the fact that nitrogen is available to plants only in certain combinations, that it is slow to form and easily leaves these compounds, that it readily escapes from manures and soils into the air and is leached away by water, it is one of the most commonly deficient and hence one of the most costly ingredients of the food of plants."

The ashy, inorganic or mineral portion of plants consists principally of potash, soda, lime, magnesia, iron, silica, phosphoric acid, sulphuric acid and chlorine. Does a fertile soil furnish all these constituents of plant food? The answer to this question is given by the analyses of such soils. I select one from Prof. Johnson's "How Crops Feed." Baumhauer's analysis of an alluvial deposit from the waters of the Rhine, near the Zuider Zee, in Holland. This soil, which produces large crops, contained:

	Surface.	15 in. deep.	30 in. deep.
Insoluble silica, quartz, -	57.646	51.706	55.372
Soluble silica, - -	2.340	2.496	2.286
Alumina, - - -	1.830	2.900	2.888
Peroxide of iron, -	9.039	10.305	11.864
Protoxide of iron, - -	0.350	0.563	0.200

	Surface.	15 in. deep.	30 in deep.
Oxide of manganese,	0.288	0.354	0.284
Lime,	4.092	5.096	2.480
Magnesia,	0.130	0.140	0.128
Potash,	1.026	1.430	1.521
Soda,	1.972	2.069	1.937
Ammonia.	0.060	0.078	0.075
Phosphoric acid,	0.466	0.324	0.478
Sulphuric acid,	0.896	1.104	0.576
Carbonic acid,	6.085	6.940	4.775
Chlorine,	1.240	1.302	1.418
Humic acid,	2.798	3.991	3.428
Crenic acid.	0.771	0.731	0.037
Apocrenic acid,	0.107	0.160	0.152
Other organic matter and combined waters, (nitrates ?)	8.324	7.700	9.348
Loss in analysis,	0.540	0.611	0.753
	100.000	100.000	100.000

An examination of the analysis, shows the soil to be rich in the alkalies and phosphoric acid, in fact in all the elements of plant food except the nitrates, which were not separately determined. The absolute quantities of the most important substances existing in an acre of this soil taken to the depth of one foot, and assuming this quantity to weigh 3,500,000 lbs., are given by Prof. Johnson, as follows:

Soluble silica,	81,900 lbs.
Lime,	143.220 "
Potash,	35,910 "
Soda,	68,920 "
Ammonia,	2.100 "
Phosphoric acid,	16.310 "
Sulphuric acid,	31,360 "

This soil contains potash enough for 528 crops of potatoes at 200 bushels to the acre in each crop, or for 1,496 crops of wheat, at 25 bushels in each crop. It contains phosphoric acid enough for 741 such crops of potatoes, or for 815 such crops of wheat. This soil is exceptionally rich in the elements of plant nutrition, differing in a marked manner in composition from that of a barren soil, the analysis of which is here submitted as made by the illustrious author before quoted.

Prof. Johnson's analysis of a soil from the Upper Palatinate, "which was characterized by Dr. Sendtner, who collected it, as 'the most sterile soil in Bavaria':"

Water,	0.535
Organic matter,	1.850
Silica,	0.016
Oxide of iron and alumina,	1.640
Lime,	0.096
Magnesia,	trace.
Carbonic acid,	trace.
Phosphoric acid,	trace.
Chlorine,	trace.
Alkalies,	none.
Quartz and insoluble silicates,	95.863
	100.000

It will be observed that this soil contains but a trace of magnesia and phosphoric acid, and of the alkalies none at all. It is added, "This soil was mostly naked and destitute of vegetation, and its composition shows the absence of any crop-producing power."

From the study of analyses of different soils, and a comparison with the composition of plants, it has been ascertained that most soils contain certain constituents of plant food in such abundance as to require no attention on the part of the farmer. Thus in ordinary farm practice, it is rarely if ever needful to look after the supply of iron, of chlorine or of silica, and seldom of soda or magnesia. Of lime and sulphuric acid the soil is more often deficient, and hence the good results frequently observed from the application of lime and plaster. Nitrogen, phosphoric acid and potash are the ingredients of the soil of which it is most liable to become exhausted by plant nutrition. It is these constituents of plant food, the supply of which must engage the thought of the farmer who would maintain his fields in fertility.

So far as the plant is concerned, no one of the elements of plant nutrition can be regarded as more essential than another, since all are indispensable. No plant can grow and come to perfection unless it has a supply, in due proportion, of every element which an analysis of the plant would disclose. A plant may have access to all the mineral elements required for its growth, but if it cannot obtain nitrogen these will be valueless to it; the plant will not grow. So, if potash or lime or magnesia be wanting in the soil, it will be of no avail that all other needful constituents be present, the plant will not grow minus potash or lime or magnesia, but will refuse to grow at all.

It seems an obvious consequence of the principle just enunciated, that the maximum crop which can be produced on a given area is determined by the minimum quantity of any element of nutrition which the soil can furnish. For example, if the soil contain but a small percentage of potash the quantity of crop which such land can produce will be measured by that small percentage. Plants will not continue to grow after the available potash is exhausted. The same is true of their deportment with respect to every other element of plant food. Another principle well settled in the theory of plant feeding, is that in relation to the condition in which the elements of nutrition must be presented to the rootlets of plants in order that they may be taken up and appropriated. It can hardly be said that plants live by eating but by drinking, and hence their food must be furnished by the soil in the liquid state. Only soluble substances in the soil, therefore, can contribute to plant growth. It is not sufficient that silica, phosphoric acid and lime exist in the soil, they must exist there in a soluble condition, to contribute anything to plant life. The potash of feldspar, the phosphoric acid of the mineral apatite and the nitrogen of peat, may be completely unavailable for plants, because locked up in insoluble combinations. A chemical analysis of soil is often deceptive, in that while it furnishes a knowledge of the elements actually existing in the soil, it does not indicate the condition under which they exist, or whether they are available for the sustenance of plants; and thus while a soil may be found to contain every element of plant food in abundance, it may, nevertheless, be perfectly sterile.

In briefly noticing nature's agency in the production of crops, an attempt has been made to show what the soil must supply, and some of the conditions most favorable for plant growth. Of equal importance with the subject of supply of plant food by the soil is the question of its permanency. Can our fields be cropped year after year, and by their natural strength support plant life in any considerable abundance without ultimately reaching a condition of complete exhaustion? The action of the atmosphere, of moisture, of frost and other natural agencies in the soil is such as to disengage annually a certain amount of plant food and hold it in reserve for growing plants. In this regard every soil has a certain inherent capacity. The rate of disintegration of the coarser materials and of the formation of the constituents of plant nutrition depends upon physical conditions, as temperature and moisture, as well as upon the chemical character of the soil.

Messrs. Lawes and Gilbert proved the natural wheat producing power of the soil at Rothamstead to be about 16 bushels to the acre annually. They obtained from the same soil, without the application of manures, 20 successive crops of wheat, the first of which was 15 bushels and the last 17½ bushels per acre, the average of all being 16¼ bushels. In this soil the processes of weathering and nitrification render available each year the amount of plant food abstracted by a crop of 16¼ bushels of wheat to the acre. In another soil the same processes may render available a smaller or a larger quantity of plant food, of which the amount of crop whatever it may be that can be taken from it for a series of years, without the application of fertilizers, is a nearly exact measure. In time, it is doubtless true that the compounds in the soil whose disintegration has furnished the alkalies, phosphates and other elements of plant food, may become so reduced in quantity as to supply little or no sustenance for crops, and thus the land be reduced to comparative sterility. In soils fairly rich in the materials for plant growth, and of ordinary depth, this period would be measured by centuries.

The expression "exhaustion of the soil," as commonly employed, indicates a relative rather than an absolute condition, and is designed to imply that cropping has been carried beyond the point of remuneration; or, in other words, the cost of raising a crop is more than the crop is worth. The speedy exhaustion of the soil, of which one frequently hears, has really no existence in nature. A soil may become impoverished of certain elements of plant food, and it is a part of man's agency in the production of crops to restore these wasted elements. A soil may become impoverished of certain elements required in large quantities for one crop, and yet yield generous returns of some other crop. These are not, in any true sense, cases of exhaustion or results of poverty of constitution, but conditions against which any intelligent farmer can readily provide.

In further consideration of the agencies which have to do with the production of harvests, it is worthy of notice that nature takes no direct cognizance of man's wants. She does not ask what plant he would have grow here or there. She furnishes the storehouse and conservatory of food for plants, but yields the food supplies to them only sparingly. She does not wholly determine whether 100 bushels or 200 bushels of potatoes shall be grown to the acre. She does not wholly determine whether the yield of wheat to the acre shall be 16 bushels or 32 bushels. As at Rothamstead, she may furnish annually food supplies for 16 bushels of wheat per acre, but it must be due to man's agency if a larger amount is secured. With nature it is not a matter of consequence whether a crop be remunerative or not. It is man who is seeking the margin of profit, which he can obtain only in obedience to her laws. In presenting the food of plants locked up in the coarser or finer fragments of rocks, and in partially decayed vegetable matter, she in effect says to the husbandman, "Put in the plow and pulverize the soil thoroughly, put on your stores of plant food from the farmyard, your ashes and the materials of the waste heap, your lime and plaster, your phosphates and nitrates, that by their direct and indirect action richer and more abundant stores of food may be made available to your crops." The farmer who heeds the lesson will reap his reward in abundant and remunerative harvests. In the production of crops it is evident that man and nature work together, and that man's agency may be very helpful in bringing the nominally "worn out" soil into conditions of fertility.

The underlying idea of a *more intensive culture* in farming is the literalizing of all that is implied in making "two blades of grass grow where but one blade grew before," namely, the making of two bushels of corn or of barley or of wheat, grow where but one bushel grew before. It implies thorough underdrainage where underdrainage is needed. It implies complete pulverization of the soil where thorough pulverization is needed; in a word, whatever may be necessary to secure the mechanical condition of the soil best adapted to bountiful crops. It implies more; it implies a generous feeding of plants with the chemical elements of plant food, especially with those constituents of plants not abundantly restored by nature's processes, those which are most largely carried away in the crops and in the products of domestic animals, the nitrogen, phosphoric acid and potash. These must be supplied by the farmer, whatever else he may furnish or fail to furnish, if he would maintain his land in fertility and gather generous harvests. In the renovation of the soil and the production of crops, what *are* his sources of supply? From the farmyard he obtains a complete fertilizer, one containing all the ingredients of plant food; bulky, it is true, and slow in action, except when old or well composted, nevertheless fulfilling the requirements of a complete fertilizer most perfectly. From the ash heap he obtains also a valuable fertilizer, one supplying directly not only a large percentage of potash but all the other soil ingredients of plant food except nitrogen, and one whose indirect action is likewise important in rendering available to plants other materials in the soil. From the bones of animals ground, or treated with sulphuric acid, he obtains lime and phosphoric acid for plant food. These are the most readily available sources of supply. Let the farmer furnish from these or other sources, whatever fertilizing materials he can command, and still the "crying want" of his land is for more. As before stated, nature supplies a part of the constituents of plant food in constant abundance, and a part in quantities not sufficient for large crops. Man must furnish the deficiency in order to reap bountifully.

More specifically, what besides his general fertilizers need the farmer furnish? Although it may be necessary in some soils, and may become necessary in any soil to supply lime, sulphuric acid and magnesia, yet almost universally the great demand is that which has been stated, for available potash, phosphoric acid and nitrogen. The amount of the last named substances present in the soil in soluble condition, very largely determines the abundance of the crop. In fact, there is in most cases nearly a direct ratio between the amount of available potash, phosphoric acid and nitrogen, and the products of the soil, up to a certain maximum limit. This limit is farther removed from the average crop than at first thought might be supposed. Experiments made in the growing of barley, show that for this cereal the limit is fully 4½ times the yield obtained under average agricultural conditions. This number compared with unity, is probably not too large to represent the relation between the maximum and the average yield in the case of the other cereals. Suppose the ratio between the maximum and average crop of wheat to be 2 to 1, (the ratio is really much larger) and the average yield to be 15 bushels to the acre, the maximum yield would then be 30 bushels to the acre. Every farmer understands that the profit in growing wheat would be on the last 15 bushels to the acre, rather than upon the first. The larger part of the first, would be required to cover cost of cultivation. The profit comes from the excess of the product above that required for the cost of production.

The science of chemistry is not a blind guide in agriculture. It has shown not only what the various crops remove from the soil, but precisely the amount of each ingredient of plant nutrition. It has indicated definitely the amount of each of the most essential (i. e. most readily exhausted) constituents of plant food which must be supplied, that any desired result within the limit of possibility may be attained. "How then," comes the inquiry, "shall I make my wheat field which now yields fifteen bushels to the acre, furnish a crop of thirty bushels of wheat to the acre?" The answer is obvious: "feed for thirty bushels to the acre." If your land will naturally produce fifteen bushels of wheat to the acre, and from the home resources you can supply only enough of fertilizing material to bring the yield up to twenty bushels to the acre, evidently you will have to apply an amount of food (probably only potash, phosphoric acid and nitrogen) for wheat represented in the roots, straw and grain of ten bushels of this cereal; or, in other words, about ten pounds of potash, eight pounds of phosphoric acid, and 16½ pounds of nitrogen. It is not necessary that these be applied in a bulky form, but in the form of the chemical salts, which will furnish to the roots of the crop the several substances in soluble condition.

With proper mechanical cultivation of the soil, and with average meteorological conditions, disregarding the effects of insect ravages, the question of any desired amount of crop less than the maximum, is very largely, in fact almost wholly one of supply of plant food. The generous feeding of plants may not require any considerable outlay for fertilizers, the home resources of the farmer in this regard may be sufficient; generally, however, they are not. When they are inadequate, he can profitably supplement the home supply with more concentrated fertilizers. In fact, he cannot afford to cultivate a farm and not supply his growing crops most liberally with plant food. If one sort of crop requires potash in large quantity, for that crop it will pay to supply potash; if another requires liberal feeding with phosphoric acid, for that crop it will pay to supply phosphates; if another requires nitrogenous food, for that crop it will pay to supply nitrogen in form to be appropriated; and, generally there are but few soils to which all three of these most essential constituents of plant food can be supplied without a decided gain in the abundance and quality of the crop, and hence in the margin of profit.

As regards the sources of supply of the concentrated forms of fertilizers, it may be remarked that the ammoniated or nitrogenous superphosphates furnish nitrogen, phosphoric acid, sulphuric acid and lime at moderate expense, and the German potash salts furnish potash and magnesia. These together constitute a complete fertilizer, inasmuch as they supply in soluble form all the constituents of plant food of which the soil is ever subject to be exhausted. In determining, however, with what to supplement the home supply of fertilizers, reference should be had to the crop to be grown and the amount desired above what the soil naturally produces, and the supply of the different elements of plant food be proportioned accordingly.

This subject of plant nutrition with reference to definite results, has been carefully elucidated by Prof. Levi Stockbridge of the State Agricultural College in Massachusetts. The almost marvellous precision with which results proposed have been obtained, is certainly a strong confirmation of the correctness of the theoretical principles on which this method of plant feeding is based, and an illustration of its practical value. Prof. Stockbridge has prepared tables based upon the chemical composition of the "tops and roots or tubers of our root crops, and the roots, straw and grain of our cereal crops," showing the amount of nitrogen, potash and phosphoric acid, and the sources from which they can be most economically obtained, to produce above the natural product of the soil any required amount within the limit of possibility of our various crops. A few of his formulas are here given:

POTATOES.

To produce 100 bushels of potatoes per acre and their natural proportion of tops more than the natural product of the land, and for other quantities in like proportion, use

Nitrogen,	21 lbs.	In the form of	Sulph. ammonia, 24 pr. ct. dry salt, 105 lbs.
Potash,	34 lbs.		Sulph. potash, 35 " " 225 lbs.
Phosphoric acid,	11 lbs.		Superphosphate, 13 " sol. acid, 85 lbs.

INDIAN CORN.

To produce 50 bushels of the grain and its natural proportion of stover to the acre more than the natural yield of the soil, and in like proportion for other quantities, use

Nitrogen,	64 lbs.	In the form of	Sulph. ammonia, 24 pr. ct. dry salt, 320 lbs.
Potash,	77 lbs.		Muriate potash, 80 " " 154 lbs.
Phosphoric acid,	31 lbs.		Superphosphate, 13 " sol. salt, 248 lbs.

WHEAT.

To produce 25 bushels of wheat and the natural proportion of straw per acre more than the natural yield of the land, and in like proportion for other quantities, use

Nitrogen,	41 lbs.	In the form of	Sulph. ammonia, 24 pr. ct. dry salt, 205 lbs.
Potash,	24 lbs.		Muriate potash, 80 " " 48 lbs.
Phosphoric acid,	20 lbs.		Superphosphate, 13 " sol. acid, 160 lbs.

BEETS.

To produce 100 bushels of beets and their tops on a given area of land more than its natural yield, use

Nitrogen,	11 lbs.	In the form of	Sulph. ammonia, 24 pr. ct. dry salt, 55 lbs.
Potash,	25 lbs.		Sulph. potash, 35 pr. ct. " 155 lbs.
Phosphoric acid,	6 lbs.		Superphosphate, 13 " sol. acid, 50 lbs.

At present rates, the cost of the materials for the amounts named of the several different crops, above the natural product of the land, is about as follows:

For 100 bushels of potatoes, $12,00, or 12 cts. per bushel.

For 50 bushels of Indian corn, $27,00, or 54 cts. pr. bush. In raising 50 bushels of shelled corn about 2¼ tons of stover would be obtained, which, at $6.00 per ton would be worth $13.50, or one-half the cost of the fertilizer.

For 25 bushels of wheat, $16.00, or 64 cents per bushel. The extra amount of straw would be worth at least $8.00.

For 100 bushels of beets, $6.00, or 6 cents per bushel.

The tests that have been made with these fertilizers in various parts of New England and the Atlantic States, show that they furnish in the main a reliable and profitable method of largely increasing all the farm products, for with increased crops come enlarged flocks and herds, and an increase of the products which they furnish. It is gratifying, also, to note, that experiments thus far made, indicate no deterioration of the quality of the soil from their use, but rather increased fertility.

After repeated and carefully conducted experiments with these fertilizers for a series of years, on the College farm at Amherst, Mass., and after a wide observation of their use by practical farmers in that State, and beyond its limits, Prof. Stockbridge says of them: "If there is no great mistake in the principles and results, the conclusion must be drawn, that they solve one of the great agricultural problems of our time; a problem the solution of which has caused the greatest anxiety in all the densely populated countries of the globe, and one that has been a source of much apprehension here. In all the older States of the Union, our cities, both in number and population have increased with unparalleled rapidity. The civic population increases faster than the rural, the consumers of food faster than the producers. From all the rural districts enormous streams of soil products, in the form of vegetables, grains, meat, and raw material for manufacture, are pouring into these centres. These are the choice elements of the soil, the waste of which would maintain its producing power; but owing to our wasteful systems of sewerage it is all, or nearly all lost, and as a result these States have seen their agricultural lands producing less and less per acre of all of our important crops, until millions of acres, once productive, have become so sterile that their crops will not pay the cost of their cultivation. . . . All this because the food products of the people taken from the soil are not in any form returned to it. This cause has seemed a necessity, one whose results could not be avoided, if we must depend on the waste products of our crops to support the producing powers of the soil. But chemical manures may supply the deficiency. They will produce plants of choicest qualities, and in luxuriant abundance. With profit to the cultivator, they may be the means of covering our hill-sides, valleys and plains with beautiful, bountiful crops of grass and grain, and at the same time restore their exhausted acres to permanent, pristine fertility."

In the high cultivation of his land, whatever fertilizers the farmer employs, he should observe the following precepts: 1st. Insist that the chemical composition of the fertilizers be distinctly stated and guaranteed by the seller. 2d. Select those "which furnish the fertilizing ingredients required by his land and crops, in the best form, and at the lowest price per pound." 3d. Purchase only of responsible parties.

The work of the agricultural experiment station in Connecticut, and the analysis of fertilizers at the Agricultural College in Massachusetts, within a brief period of time, have contributed largely to a revolution in the trade in fertilizers, so that no New England farmer need now invest in them without obtaining the value received.

It is not advocated in this paper that in order to high cultivation it is indispensably necessary to employ commercial fertilizers. It is claimed, however, that the only farming which pays, is that which liberally feeds the growing crops, and that to secure remunerative harvests, plant-food in abundance must be supplied, if not in one form then in another. The means of generously feeding his crops are fortunately at the command of the farmer; he who uses them wisely and well shall rejoice in full granaries and storehouses, in increasing flocks and herds as the substantial tokens of his thrift and prosperity. The principles of farm economy which have been considered are not limited to the cultivation of the soil, or to simply the raising of crops. The generous feeding of animals is not less essential to the farmer's success than the generous feeding of plants. The margin of profit is here secured, not by that method of feeding which simply maintains life, but by that system of feeding which enables the animals to furnish products; and not only this, but to furnish them in the largest abundance.

The methods of an intensive culture, applied to the farm, extends to all its departments and to all its operations, and the results that would follow, were they generally adopted, can hardly be estimated. The truth is not overstated by Mr. J. R. Dodge of the Statistical Bureau at Washington, when he affirms "the average yield per acre could be doubled, if the many could be brought up to the plane of the few, in the practice of intensive culture." Mr. Joseph Harris states a well-known but lamentable fact, when he says "we raise from 10 to 15 bushels of wheat per acre, where we ought to get 25 to 30 bushels; we raise 30 bushels of corn instead of 60, and 75 bushels of potatoes instead of 200."

The difference between what is raised and what *might be* is not an unimportant matter, for it implies a loss to the country of more than it now produces. To bring up the farm productions of the country to an adequate standard, one to which they can with profit be brought, may well be a part of the initial work of the new century.

If we limit the consideration to our own State, it is not too much to say that by intensive and judicious culture, by means ready of command, the farms of Maine can be brought to furnish, within a few years, double the present amount of products, to carry double the present amount of stock, and to leave annually in the pockets of farmers four-fold the present margin of profit. Increased prosperity with the farmers of Maine, implies renewed activity in all business enterprises, larger success in all other vocations, and a more complete development of the grand resources of our noble State.

From larger resources to the individual are derived comparative freedom from much that is now esteemed drudgery in farm life, pleasanter surroundings, and more abundant home comforts, papers and books, and a higher social life. Such a condition not only enlarges and brightens the horizon of the individual, but it reaches beyond to his neighbors, and forward to those who shall come after him. It implies encouraging advantages and high educational acquirements for his children, but with no abatement of that love of farm life which is sure to be abiding when such life is seen and known under favorable conditions. It implies, finally, the presentation to the State of that worthiest product, to which all others are tributary, a generation of noble men and women, throughout all her borders, occupying and adorning the thrifty and happy homes, which are at once the charm and the reward of a cultured rural life.

WOOL PRODUCTION AND SHEEP HUSBANDRY.

By John L. Hayes, Secretary of the National Association of Wool Manufacturers, Boston.

[Note.—This lecture was extemporaneous, and is here produced from the reporter's notes. The lecturer has corrected only some statements of facts, without attempting to modify the familiarity of style due to purely oral delivery.—J. L. H.]

Ladies and Gentlemen: I can assure you it is with no little satisfaction that I come again to my native State. I have always felt a peculiar interest in her prosperity, and pride in my own origin. Two of the most active years of my life were spent not far from you, at the Katahdin Iron Works, and were devoted to the development of another branch of Maine industry than that which interests us to-day. There I had the pleasure of kindling, or rather of having my wife kindle, the first fire lighted in Maine for the successful smelting of iron ore on a large scale. One of the gentlemen here this morning spoke very fittingly of the propriety of one who addresses an audience, bringing his passports to show the authority with which he speaks. The passport which I offer is that I am one of the oldest sheep husbandmen in Maine. My father, Judge William A. Hayes, had a large farm in York county, and was one of the first to introduce Merino sheep. He and his brother-in-law, Mr. John P. Lord, still hale and hearty at the age of 93, were the first to introduce Saxon sheep into the State. When I was a boy, many and many a day and evening during the month of February, the time when rather unwisely the lambs were allowed to be brought forth, I have taken the delicate creatures from the barn and carried them into the cellar of the house, and there I used to have to sit hours and hours and nurse them. That created in me a taste for wool-husbandry, and that interest was fostered by a woolen factory being built at Salmon Falls, just across the line in New Hampshire. There I first saw the process of making cloth, and when I was graduated at Dartmouth, I induced my class to send down and get the cloth for our commencement suits from this Salmon Falls factory. This was my first initiation into the wool business. I little thought then that I should spend so many years of my life in its development.

Of all the beneficial arrangements of Providence, there is hardly one more conspicuous than that which has placed at the disposal of man an animal capable at the same time of producing a most desirablefood, of benefitting agriculture, and of supplying one of the first necessities of man—that of clothing. These three qualities are eminently possessed by the sheep.

Before considering the qualities of the sheep, we will glance for a moment at its origin. The best naturalists are now agreed that its specific source cannot be found. The general belief is, that the sheep as now known, originated from a number of species, or that distinct races existed originally as now. But, whatever may have been its origin, the sheep is distinctly traced to Asia, the cradle of the human race. The name "buck" is often mentioned in the Persian Zendevesta, the Indian Vedas, the Chinese Chow King, and is sculptured on the most ancient monuments of the Egyptians. The names Bok and Bouk are found in primitive Asiatic languages. There are no traces of sheep found among the cave dwellers of Europe, but the bones are found among the lake habitations of Switzerland; so that they were introduced at a very early day. The most striking quality about the sheep, is what may be called its plasticity. It is easily modified by man. Next to the dog, the sheep is the most plastic of all animals. As Lord Somerville has said—"The breeder of sheep may chalk out upon a wall a form perfect in itself and then give it existence." This placticity is shown in various ways. One race produced in this country is called the Ancon or Otter sheep, having a long back and short legs like the otter, and having a quality especially valuable in the district in Rhode Island where they were developed—that they will not jump fences. Darwin has referred to them as an example to sustain his evolution theory. Another is the Mauchamp race in France. A breeder in that country had a flock of Merinos—pure blooded and exceptionally fine, yet in the flock was dropped a ram lamb, very badly shaped, in fact almost a monster, but having a fleece very long and of wonderful silkiness. He went to work, and finally developed the wool known as silky wool. The dress stuff known as "chally" is composed of seven parts of this wool and only one part of silk, and the whole fabric appears to be silk. There was a very extraordinary development of an absolutely new quality—the obtaining of a new fibre. It is so valuable that it is better than cashmere for making shawls.

There are certain remarkable qualities about wool. Its specific gravity is one, and a very important one. Cotton has a specific gravity of 1.47, linen of 1.60, silk of 1.30; while wool has a specific gravity of but 1.26, so that it is the lightest of any fibre used for purposes of clothing. We all know the difference between a cotton comforter and a woolen blanket. This quality of wool enables us to wear our warm garments without suffering, and is indeed one of its most useful qualities. Another quality of wool is its polish; still another its capacity to receive dyes. Cotton does not hold dyes, like wool or silk. This quality of wool is a very interesting one. On that card are specimens of flannels of fifty different colors, and the manufacturer is making a hundred. This seems remarkable; but in the famous Gobelin tapestry there are as many as 2,500 distinct hues and shades. Some of you who were at the Centennial Exposition will remember the picture of Penelope, sorting and winding her wool and weaving it into embroidery. The hues are more brilliant and the tones more delicate than can be produced by any pigments.

But perhaps the most important quality of wool is the character of its fibre. The first question that occurs to us is: Why does wool spin? You see easily enough why silk and flax can be spun. They have long fibres, and all you have to do is to twist them together. But how is the fibre of wool, which is sometimes only half an inch long, spun? It is due to the quality of the fibre. These two short fibres, cotton and wool, exhibit peculiar qualities. Cotton spins because its fibre was originally a hollow cylinder, not absolutely hollow, but a cylinder that when it dries, dries in the shape of a cork-screw. Manufacturers have been subjecting the fibre to heavy weights, and wondering why it would not spin. The greater the pressure the worse it spun, because it crushed the curl and prevented the fibre from hanging together. One of the latest improvements in the cotton manufacture consists in correcting this process. Wool is very differently constructed. In each fibre there is a series of thimbles with serrated edges dropping into each other. These little points project past each other and all curl round the cylinder of the wool. Each of these little points is of the same size; they are of the same size in coarse as in fine wool, but in fine wool they are closer together. It is these little points or barbs that give to wool its power of spinning. The points of the barbs of one fibre catch into those of another; and more than that, they give the felting power to wool. The wool of the closest fibre, or with most projecting barbs, has the highest felting power. The finer the wool is, the higher is its felting power; therefore, it may be made into broadcloths and fine felts.

At the bottom of the different fibres of wool are a series of bulbs, one set furnishing the yolk. The other bulbs contain a cellular substance which is developed into the filament of wool. The bulb gives to the filament of wool its size or diameter, and its manner of curling. You know that Merino wool has its curl and Cotswold *its* curl. The curl is governed by the shape given to it in the bulb. Another fact is that the shape of the bulb gives size to the fibre; so that if you increase the activity of the bulb, you add to the length of the wool but do not change its fineness. Instead of being short wool it becomes long; instead of being clothing wool it becomes combing wool. This is something that has been recently developed.

What is the difference between wool and hair? Hair originates in bulbs of the same character as those from which wool is produced. It principally differs from wool in its coarseness—its greater average diameter. Most of the fur bearing animals, as the otter and the beaver, have two coverings, an outer one called fur and an interior one called down. Now the theory is that wool is simply this down developed. The most accepted theory is that the sheep in its primitive state was provided with a covering of coarse hair, beneath which was a shorter covering of a wooly down. By culture the hair has been dropped, and the down developed into wool. I have here specimens of the pelt of an Arabian sheep furnished me by Mr. George William Bond, who is a believer in this development theory, and is making some important investigations upon the subject. This specimen you will see is apparently covered solely with coarse hair, and you might mistake it for the pelt of a calf or dog. But you will see entangled in the hair some fine down which the animal has shed. From other portions of the same skin, Mr. Bond has carefully separated the down, a specimen of which I show you. It has the fineness and silkiness of the silky Mauchamp wool, the diameter being so small that there are 2,000 to an inch. Some other facts support this theory. Coarse hair is often developed by careless breeding in our finest Merinos, and you are aware that the Merino lamb when first born is covered with coarse hair which soon drops out. This hair is supposed to be a relic of the primitive covering of the animal.

I have not yet noticed another characteristic of wool—the yolk found in the Merino sheep. This yolk is pure soap, that is, it is composed of grease and potash. It contains so much potash that by the chemists of France it is largely used in making Prussian blue. I have seen beautiful pictures made from these blues of the sheep's fleece. The amount of potash obtained from the fleeces of France, is more than enough to make all the gunpowder that is used in that nation. You see that there is, then, a great loss of an important element of fertility in the ordinary methods of washing sheep. Manufacturers are now turning this element into account by saving it. I know one manufacuturer who has made his farm rich by the application of the potash he has got from the yolks of his sheep.

My next point is the characteristics of the distribution of the races. A really scientific classification is of great importance, as all true science is but systematized knowledge. The old system of classification was based upon the character of the fleece. The writer who has thrown most light upon this subject, is M. Sanson of France. He has divided sheep into two classes, and regards all sheep as having sprung from perfectly distinct species. As the result of this theory species are fixed. He regards hair or wool and flesh as secondary qualities, which can be modified by culture. He makes his classification depend on the shape of the cranium. The cranial cavity has two diameters; *longitudinal* from the point of the auditive conduit to the bottom of the orbit of the eye; *transversal*, measured by the distance which separates the summits of the perforations of the ear. If the longitudinal diameter is greater than the transverse, the cranium is called *dolico-cephalous*, signifying an elongated cranium. If the transversal is as great or greater than the other, it is called *brachy-cephalous*, signifying a short cranium. This leads to the classifying of all races into two great groups.

Short Cranium.	Long Cranium.
Leicesters,	Cotswold,
Lincolns or Romney Marsh,	Merino,
South Downs.	Type of the Pyrenees.
Limousin,	
Barbarous.	

Now this is apparently a mere theory, but you see the practical consequence of it, for it makes the Merino and Leicester belong to two great distinct species originally. If this be so the crosses of these sheep will never produce a permanent new race. There will be danger of reverting.

Without pursuing this classification further, let us recur to a more popular classification. Dr. Fitzinger of Vienna makes ten distinct original races, viz:

Fat rumped, 7 varieties; Stump tailed, 5; Short tailed or Heath, 10; Tackel, 4; Fat tailed, 8; Rustic, 50; Pendent eared, 4; Long legged, 9; Long tailed, 5; Maned, 4.

Thus he makes 106 varieties. It would be impossible, while, if it could be done it would be confusing, to follow the description of each of these varieties. Therefore, without further attempt at classification, I will briefly describe the most important races, considered from a practical point of view.

One of the most important varieties is the Barbarous type,—adopting Sanson's classification. These are the sheep of Syria, the sheep of the Bible, and exist now as they have existed from time immemorial. These sheep have fat tails and fat rumps. Often a sheep weighing 150 pounds will have a tail weighing 50 pounds. Probably not many of us are accustomed to associate with our ideas of the paschal lamb an animal of this character. Heroditus, whom people used to suspect—as I see some of you suspect me now—of telling big stories, states that the people of eastern countries fastened trucks to their tails, so that they could be carried with ease. This practice is still followed at the east. The fat of their tails is used as a substitute for butter, and is sold in the markets of the east, being regarded as an indispensible article. The wool is coarse and long, and is admirably adapted for carpets.

Another is the Colchican or long-tailed sheep of Georgia in Asia. This was the country where the Argonauts went in search of the Golden Fleece. The wool was remarkable for its whiteness. The Heath or short-tailed sheep are those belonging to the Shetlands, Highlands and other heath countries of Europe. One variety of the rustic stock deserves mention, the Choanos of Spain. They are a small sheep and have a coarse wool. Some writers have stated that the sheep of Mexico and South America were degenerated Merinos. They are really descended from these Chourros, the native sheep of Spain. All these wools of the barbarous sheep and of the Choanos are carpet wools, constituting the wools known in our tariff classification as wools of class third. They are produced by barbarous or semi-civilized people. They are not fit to be cultivated in this country with our high prices of labor, for the same reason that you would not grow rye where you could just as well grow wheat.

The next great class of wools is that known in our tariff classification as wools of the second class, and consists of what are known as combing wools. They are the product of the English races. It is remarkable that England should have developed such peculiar and marked races of sheep, but England has been from time immemorial devoted to wool culture and sheep growing. Wool was called in ancient times the "foundation of England's riches—the flower and strength and pride and treasure of England." The seat of the Lord Chancellor was the wool-sack, emblematical of the natural importance of wool. So abundant was this staple in England, that as early as 1390, 47,000,000 lbs. were exported. For centuries England exported nothing but tin and wool. You know that in former times the people of England were exceedingly isolated in their several counties. Their dialects were entirely distinct one from another. Under these conditions their breeds were kept distinct, until finally distinct varieties of sheep were formed, of which there are something like eighteen.

The most marked one of these is the Lincoln, found in the fens of Lincolnshire. These sheep produce an enormous bulk of wool, though not much grows on the bellies. The wool is of great lustre, and of great length. It will surprise you to know how valuable it is. It has a lustre almost like mohair. It is said that a Lincoln sheep on exhibition had a fleece of twenty pounds, the wool being 18 inches long. This was a hogget fleece—that is, from a lamb that has never been shorn. It would produce wool enough when diluted with cotton to make 672 yards of alpaca, or enough for 56 ladies' dresses. This was stated by a manufacturer in a public meeting in England.

The next important variety of which I shall speak is the Cotswold. These are long wooled sheep, and are grown on higher land than the Lincolns, in the counties of Gloucestershire, Herefordshire and Worcestershire. The name comes from two words, *cot*, signifying the shed in which they were kept, and *wold*, the open hilly grounds on which they were pastured; and they are now often kept in cots or sheds and tied up at night like cattle. The Cotswold is a hardy animal, with a heavy carcass and coarse wool, and is for certain purposes, of high value. They do not fatten so early as the Leicesters, but have a longer and a heavier fleece. They are suited for exposed situations and somewhat scanty pasture. The Cotswolds are very popular in this country. But there are not many pure-blooded Cotswolds, as they have been crossed with the Leicesters.

The Leicesters are found in the midland counties of England. They have a white face, no horns, and clip from 8 to 13 lbs. of wool, from 10 to 15 inches long. They are among the oldest races of English sheep, and the Leicester is unquestionably the origin of the native stock of the U. S. —that is, the old Leicesters, not the improved Leicesters. They were run down by low feed, but even in their degenerated state they retain many of the qualities of their ancestry.

Up to the middle of the last century, sheep were grown in England entirely for their wool. The first step toward improvement was the introdnction of the turnip culture, by William of Orange, at the end of the 17th century. They were fed to sheep, and it was found that by growing them the same land would support treble the number of sheep. Then sheep were grown for their mutton. Mutton became the first object and wool the secondary object. Soon after this a further improvement was made by an extraordinary man, Mr. Bakewell of Dudley. He conceived the idea that sheep could be modified. He went to work on the Leicesters —took the small Leicester and developed the improved race, which he called the New Leicesters. The results of his operations were such that they attracted the attention of all

England, and the prices received for the services of his rams amounted to 5,000 guineas per annum. The Leicester is famous for its power of preserving those qualities imparted to it by Bakewell. The wool is finer than the Cotswolds', and better adapted for the dress goods fabricated from combing wools. The Cotswolds and Lincolns have been modified by the Leicesters. The great change which seems to have been introduced was the shortening of the time in which the animal matures. It was made to fatten in one year, and to attain full maturity in two years. It took four years to mature a sheep in the old times. What then was the result of this improvement? You can see at once that a man could turn his capital twice over in the same time, and this improvement for mutton worked a marked improvement in the wool, as the wool was principally furnished by young and healthy animals.

The Downs are raised upon the chalky plains of England. The weight of the sheep is from 65 to 90 lbs., and they produce a fleece of about 4 lbs. They produce the best mutton and are the hardiest and healthiest of English sheep. Their wool is a middle wool, and well fitted for combing.

The only other race of importance which I shall refer to is the Chevoit. The sheep of Scotland are of two races. The sheep of the Highlands are small, but when fattened the mutton is esteemed as of great value. On the low hills of Scotland and the northern part of England the Cheviots have taken the place of these sheep. They are small sheep and bear combing wool. The carcass weighs about 60 lbs., the fleece about 3 lbs. They stand the snows and the cold well and earn their own living the year through. Crossed with the Leicester they make a beautiful combing wool. The cross is termed the Roxburx sheep. The Chevoit has been little introduced into the United States, but it seems to me to be peculiarly well adapted for experiment, at any rate, and particularly in this State.

Another sheep bearing combing wool is the Texel, which is a cross of the English and African races.

The Merino sheep is the greatest boon that manufacturers ever had. It is the foundation of the wool manufacture of the present day. You can see why. It is not only because of its fineness, but of its firmness, and because it has a higher fulling power than any other. The strongest clothing can be made from it. Take a rope with a hundred strands and it is much stronger than one of the same size with only fifty strands in it. The more strands in the same diameter the stronger it is. So with your cloth. The more fibres it has in it the more enduring it is, and consequently Merino wool makes the most enduring cloth.

The Merino is probably a relic of the Roman civilization. We find that the old Romans kept fine sheep at Tarentum. They were clothed in wool altogether, as silk and cotton were unknown. They understood teazeling, and knew how to full as well as we do now. There are a great many relics in the remains of Pompeii which show that they had reached a high stage of excellence in this direction. When the Goths and barbarians overwhelmed Rome, all that was swept away; but we know at the height of Roman civilization, that sheep culture had attained a high degree of perfection in Spain. Sheep of high qualities in the time of Tiberius, or about the time of our Savior, sold for a talent. Strabo refers to the sale of sheep at a price which would be equal to $1,000. We hear of high prices being paid by farmers, but we find that the same thing took place two thousand years ago. When all Italy was overrun by the barbarians the sheep remained in the mountains of Spain. When that country came under the dominion of the Moors, they bestowed high culture upon these sheep, and the sheep continued to remain there until the middle of the last century. So greatly did Spain esteem their value that she did not allow them to be exported, not even to her own colonies, to which she sent the Chourros, reserving the Merinos for herself. Charles V. established the Order of the Golden Fleece when Spain was a part of his dominions; and this, the highest of the orders of chivalry, is an indication of the value of the Merino. They were removed from one section of the country to another for pasturage, the word Merino signifying wandering.

It is scarcely a century ago that Spain rescinded her rule and allowed them to be sent abroad. The king of Spain sent them only to his royal allies. They were sent to the Elector of Saxony, for one, in 1776. And the king esteemed them so much, that after their culture had become somewhat extended, it was the custom to have read from the pulpit on Sunday directions for growing them. I have spoken of the plasticity of the sheep. When the Merinos were carried to Germany, the first attempt was made to change them and to develop the fineness of their wool. Fineness was esteemed the most desirable quality in cloth and wool. They produced fineness to such an extent that the Saxon race, or the Escurial sheep, as it is better called, excelled all others in this regard. One of the animals weighs from 40 to 50 pounds, and produces not more than from 1 to 1½ pounds of wool to a fleece. In diameter there were 2,500 fibres to the inch, and in length it was but about half an inch long. That was the standard of excellence in wool, and remained so for fifty years. The single idea was to have fineness.

Another change took place in France, when the Merinos were carried to that country in 1786. Instead of breeding in that direction, the French began to develop size and length, and the result of their efforts is the Ramboullet sheep; and the sheep are large. They produce a fine fleece, of good weight, and with a fibre much longer than the other, or combing wools. The development of the long merino combing wool in France, led to the introduction of fine merino combing wool for ladies' dresses, and made the most important change in fabrics for female consumption of modern times.

This doctrine in regard to the value of wool is changed in Germany. There is very little of the short fine stock used, and the market stock is generally what is known in this country as Vermont wool. This is a type of Merino wool with a long fibre.

The introduction into the United States of the Merino, was made at the commencement of the century, about 1802, by Gen. Humphreys. Also a good many, several thousands, by Mr. Jarvis, who had been in Spain. These are the sources of the Merinos in this country. We have developed the Merino in this country principally for the fleece. Mr. Edwin Hammond of Vermont, has developed a Merino which is known as the American Merino. The wool growers of Australia say that the only sheep which have been carried to their country and been a benefit to their flocks, are those from the United States. The French and German sheep have been no benefit, but those from Vermont have been of priceless value.

Proceeding to a sketch of the production and commerce of wool throughout the world, the lecturer illustrated by a large diagram the production and number of sheep in the world, as estimated by H. Schwartz & Co., of London, a highly competent authority. Their table is as follows:

	Year of Return.	No. of Sheep.
United Kingdom,	1876	32.252.579
Russia,	1870	48.132.000
Sweden,	1873	1.695.434
Norway,	1865	1.705,394
Denmark,	1871	1.842.481
Iceland,	–	800,000
Germany,	1873	24.999.406
Austria,	1871	20,103.395
Switzerland,	1866	447.001
Holland,	1873	901.515
Belgium,	1866	586.097
France,	1872	24.589.647
Italy,	1874*	6.977.104
Spain,	1865	22.054.967
Portugal,	1870	2.706.777
Total Europe (exclud'g Turkey and Greece) about	–	190.000.000
Australasia,	1875	62.000.000
Cape,	Estimate	16.000.000
River Plate,	"	60.000,000
North America,	"	50.000.000
Remainder of America,	"	6.000.000
Total,	–	384.000.000
Turkey, North Africa, Persia, &c., say		65.000,000
India and China, say		35,000.000
Grand total,		484,000.000

* Recent statistics place them at 9,000,000. See Report of the Department of Agriculture for November and December, 1876.

The total consumption of raw wool in 1875, by Europe and North America, is estimated by the same authority at 1,449,000,000 pounds. The estimated population of Europe and North America is 347,000,000; making the consumption of raw wool per head of population, 4.18 lbs.

Proceeding to consider the commerce in wool, the lecturer continued:

The first consideration of importance bearing on the mind with regard to the commerce of the world in wool, is this: Of all the productions of agriculture, there is no one so capable of transportation without injury, as wool. It costs the smallest percentage on its value to transport it a given distance. While it costs 80 per cent. of the value of wheat to bring it from Chicago, 30 per cent. of the value of pork, and 20 per cent. of the value of beef, it costs but 4 per cent. of the value of wool. It can be carried from San Francisco to New York for 1½ cents per pound, and from Australia to New York for 2 cents per pound. These are important considerations, and they are considerations that tell both ways. In some respects they are of great value to our farmers. They give facilities to send their stock to market; but at the same time they give great facilities to foreign producers. You are protected on your animals by the distance of the foreign producer from your market; you are not protected on your wool. Wool is, therefore, an article on which some legislation is needed, to protect the farmer who grows it.

There is a curious fact which we cannot help contemplating, showing how the great powers of the world may do good without any thought of it. All this development of the Merino wool industry grew up from the possession by the kings of Europe of the Merino sheep. They treasured them as royal privileges. It was a kingly thing to have a royal sheep. There was another kingly thing to have—china. The kings of Europe a century ago developed china. Now look at it. Everybody has china, and every man and woman in this house has Merino wool on his or her back. The blessings that have come to our people from these two things, can hardly be calculated; yet they were royal privileges originally. I would like to point out now the wool of which different fabrics are made. [At this point the lecture was made very interesting by reference to the samples of different kinds of wool and different fabrics, all of American manufacture, on exhibition.]

Of course you will say that the most prominent of all woolen fabrics is broadcloth. With the exception of one other, as I should say, it is the most beautiful and most precious, and it is the one of all that requires most skill in the making. I am happy to be able to show you the very finest article made in the shape of broadcloth. It is finer and nicer than any other thing shown at the Centennial Exposition, and the best thing about it is that it was made here in the State of Maine. It was made by Friend John D. Lang, at North Vassalboro'. I wish I could say it was made out of Maine grown wool, but it isn't. It is made of the finest Silesian wool. The next nicest fabric made from Merino wool is merino. Ladies know what I mean by that —the fine French merino. It is made from the finest combing wool. The broadcloth is made from the short fibre; this is made from the finest long combing wool. The next article of importance is our fine cassimere. I have beautiful specimens of it here, which are equal to any made in the world. They are made from fine to medium American wool, according to the quality of the cloth. Our American flannels are made from American wool, and we make better flannels than are made in Europe. You may think I am bragging a little, but as one of the judges on woolen goods at the Centennial Exposition I had a chance to see, and I know of what I speak when I say that our flannels are, as a whole, better than those of Europe. It is due to the quality of the American wool. Another fabric in which we excel in making is blankets, particularly those made from American wools. There was a handsome exhibit at the Centennial of blankets made at San Francisco. There were also some made in Minnesota, by a Maine man, Mr. Paris Gibson, which surpassed anything ever made in Europe, and he has actually sent them to Europe to be used in their sleeping cars. Another class of goods is knit goods, of which I have two specimens. They are made from American combing wools. Here is a very beautiful fabric, an American India shawl. It is made from American long wool. Here is a whole class of fabrics, worsted fabrics they are called. They are ordinarily spoken of as delaines, and are ladies' dress goods. They are made with cotton warp and are as good as though all wool. The warp actually adds to the strength of the fabric. They were formerly printed, now they are woven in most intricate patterns. Cashmeres are now made mainly from Merino wool, with cotton warp. There is another fabric, call alpaca, admirably made by the Arlington Mills of Lawrence, Mass. These are made of cotton warp, with a filling of English combing or Canada wool. They have brilliant lustre. They have only recently been made in this country. To show you the extent and excellence with which they are made, I only need to say that our own fabrics are now taking the place of the foreign entirely. They are in better taste, more desirable and cheaper. Probably there was never so great a boon to women in moderate circumstances as these goods are. Fine merinos are only worn now by people who buy costly goods because they are costly. The medium classes of goods of our own manufacture are recommended alike by economy and taste, and to show the abundance with which they are made, I may remark that one mill uses the fleeces of 10,000 sheep per week. There is another fabric that is made of long combing wools—that is, bunting. This is made of long English combing wools, Lincoln or Cotswold—Cotswold is the better. I have here a shawl which I have worn for 20 years, and you see it is a pretty good shawl yet. I exhibit it to show how durable these coarse goods may be.

I have here specimens of Ingrain and Three-ply carpets. The warp of these is made of the carpet wool of which I have spoken, while the filling is of long wool. The ingrain has two colors in a line, the three-ply three. Here is a specimen of Tapestry carpet. The warp of this is printed and the filling so woven in as to make the pattern. Here is a specimen of Brussels carpeting, which at first glance resembles the tapestry, but is much more enduring. Here is a piece of Wilton carpet. These delicate colors are made from English or Canada wool. I think you will conclude, if you examine it, that it is as perfect a piece of carpeting as can be made. Here is a piece of Tapestry Velvet, and still another of Axminster. Our carpet manufacture surpasses any in the world. We make more because the masses of our people have better furnished houses than any other. The Austrian Commissioner, who was my guest, said to me: "Why, you have your chambers carpeted; we never have anything of that kind in Austria."

I will refer to one other class of goods—worsted coatings. They are made from fine to medium wool, and are very popular goods. Men do not wear broadcloth now for business suits, they wear worsted coatings and cassimeres; consequently the demand, instead of being for fine wools altogether, is largely for medium, and this opens a wider range both for the manufacturer and the farmer.

I propose now, to discuss wool growing in its relation to agriculture. I am now, I know, stepping out of my own field and trenching on yours. I have spoken of things that I know about. Nevertheless, the relations between woolen manufactures and agriculture are so intimate, that they are constantly forced upon the mind of one who has been situated as I have been. That relation I think I may safely say is one which is beneficial to agriculture, and to make the proposition a general one, agriculture may increase its profits by making itself tributary to manufactures. Therefore, let us look at and analyze the relation between sheep husbandry and general agriculture.

You all know that lands require constant renewing; they must be fed. The best lands in Genesee County, N. Y., and in Ohio, have run out. I know of a place where a railroad was built to bring flour from a famous flour producing district, and in a few years the land became so badly run out that they had to take the rails up. Now, I lay down the proposition,—and it is one which the greatest country in the world has established by its practice—that the most economical method of manuring land is by grazing it with sheep. There are 32,000,000 sheep in England; and Scotland, which is not so large as the State of Maine, has 5,000,000 of them, and the land there is worth three times as much as it is here. Why do the agriculturists of these countries keep them? Because they have found that they do not exhaust the land like other stock. Their manure is better, because their food being thoroughly digested. The manure is dropped more evenly. And again, the sheep bite so lightly that they do not pull up any of the roots of the grasses where they feed. It is laid down as a scientific proposition, that where sheep are fed on land it does not run down. The idea has been advanced, that if a piece of land will furnish pasture for 1,000 sheep one day, it will furnish pasture for 1,001 the next day; and so at the end of the year for 1,365. Of course this is merely an illustration, but it shows the theory as believed. Another one has said that 1,500 sheep fed on an acre of land 24 hours, or 100 sheep for 15 days, would carry an acre of land through a four years' rotation.

I have read all the volumes that I could find in the Royal Agricultural Society of England bearing on this subject, and the conclusion arrived at by their writers is, that sheep do not pay of themselves, but that keeping them is the only way they can carry on their farming operations and preserve the fertility of the land. The wool pays them something, and the mutton pays something more, but the great object is keeping them to sustain the fertility of the soil. You probably know the history of English husbandry, therefore I will barely refer to the general practice. Say 1000 sheep are put on 1000 acres. They are fed every day with turnips on the land. It is supposed, theoretically, that they are all in one pasture, though of course that is not the fact. The next year grasses of various sorts are grown on the land, and on the third and fourth wheat and barley (I do not recollect in which order), and the manure left by the thousand sheep carries the land through this four years' rotation. I have heard of a case in Vermont, where a sheep farmer was compelled to abandon one farm after another, as they became too fertile for profitable sheep growing. I know the fertilizing influence of sheep culture, by my father's experience. He had 300 sheep, and his land was naturally poor—a light, dry, sandy soil; but by using muck and composting his sheep manure, and letting his compost remain for over a year, he grew such corn as I never saw anywhere else. A man in Wisconsin who kept sheep, at the end of twenty years raised his 24 bushels of wheat to the acre, while the average yield of wheat in Wisconsin is but 10 bushels per acre. Probably you know about this thing better than I do, but I will adduce one other instance of success in renewing the fertility of a farm in this way, that of Mr. Chamberlain of Red Hook, N. Y., which I give on the authority of Hon. George Geddes, who is a very sensible and able man, and whom Horace Greeley regarded as the authority on agricultural matters in New York.

"In 1840 he purchased a farm at Red Hook that had 380 acres that had been used to raise hay to sell so long that it was worn out. The hay crop of 1841 was 17 loads; 40 acres of rye gave 10 bushels to the acre; 25 acres of corn averaged 20 bushels to the acre; the remainder of the farm was called pasture, and proved equal to the grazing of one span of horses, two pairs of oxen, and one cow. The land was so exhausted that it would not grow red clover. The so called commercial manures were tried, such as guano and superphosphates, with but little advantage; wood ashes were better, but none of these substances could be used with economy, and Mr. Chamberlain was forced to act on the assumption that the Spanish proverb is true—'The hoof of the sheep is gold.'

"The detail of his process of improvement was given by me in the Tribune in 1869, and would take too much room for repeating here. But by using sheep as manufacturers of grain, hay, straw, corn-stalks, swamp muck, (of which the farm had an abundant supply) leaves and weeds into manure, he not only restored this worn out farm to its original fertility, which could never have been very great as the soil is quite deficient in lime and consists largely of sand and ground up granitic rocks; but he made it so productive that its crops would attract attention, and be highly satisfactory in even the far-famed Genesee country or Ohio. I have an account of the crops of 1866: 800 loads of hay, estimated to weigh in the winter fully 600 ton; 40 acres of Indian corn, estimated to yield 50 bushels to the acre; wheat, for which the land is not well adapted, but which is the best crop with which to sow timothy and clover seeds, 30 acres, averaging 15 bushels; 30 acres of oats; 8 acres of roots, and the pasturage of 300 sheep and the teams, cows, &c., necessary to carry on the farm, and to supply the families on it with milk and butter. The winter before he fed 300 sheep for market, making a direct profit of $1 each, and he fed 37 steers and oxen, and wintered 300 store sheep and some cows and young cattle; all these animals made an immense pile of the most valuable manure."

Mr. Chamberlain's plan, when he first commenced making manure by using sheep, was to spread it thinly so as to make it go over all the surface he could and have enough to make clover grow, and he said that when he brought his land to where it would produce red clover, that thenceforth improvement was easy and rapid. The sheep not only gave the first impulse but were all the time depended on as the great manure producing power; and the resulting change in so short a time is most wonderful, and teaches a lesson that is of incalculable value to the whole people, and Mr. Chamberlain should be classed among the greatest benefactors our country has produced.

Mr. Dodge, the eminent statistician of the Agricultural Department at Washington, gives the following statement of the way in which sheep raising is carried on in New Jersey.

"New Jersey, lying between the two largest markets in the country, which feed a population of 2,000,000, is famed for the high prices of all feeding material, and yet this branch of sheep husbandry flourishes, there, as in no other State in the country. Her flocks, consisting mainly of ewes, are yearly changing. Selected in August for their thriftiness and adaptation to breeding, from flocks driven from Pennsylvania or Ohio, and costing from $3 to $6 per head, they are pastured in early autumn, usually served by Southdown rams, fed well during winter, their clips sold early in spring, their lambs turned off in May and June at $4 to $8 each, and the mothers in the meantime fattened to follow their offspring early in summer. Thus within twelve months, fleece, lamb and mutton are converted into cash, and from $6 to $10 per head received for feed and care besides a supply of valuable manure. Here are quick returns and good profits. The breed is the common grade Merino stock of the country, selected with reference to size, thrift and constitution; the lambs are cross-bred, partaking largely of the Southdown superiority in quality and of the aptitude of cross-breeds for fattening readily, both sheep and lambs are disposed of promptly, no feed is wasted in keeping the vital machinery in working order, and losses from old age and epizootics are avoided. This is the prominent feature in New Jersey sheep farming; it yields a present profit, and insures future fertility. Some countries in southern New York and eastern Pennsylvania pursue a similar course to some extent, with similar results, some flocks yielding a gross increase of 200 per cent. upon original cost within twelve months. A flock of 68 ewes in the summer of 1868, was turned upon Virginia wheat stubble seeded with clover, and without other feed or care over 100 lambs were sold in May of 1869, at $5 per head, realizing nearly $300 above the cost of the ewes in addition to the original stock and wool on hand. A gentlemen in York County, Virginia, writes me that he keeps 100 common ewes, breeds to Southdowns, sells an average of 80 lambs annually at $4 each, and obtains enough for wool to pay all expenses of keeping, while the benefit received by his land is equal to the interest on its value, leaving the receipts for lambs as interest and profits on investment. Another in Clark County, Virginia, tried Merinos and Cotswolds. Both breeds did well, but while the Merino lambs brought $2 each, the Cotswolds were worth $4, and the prolificacy of the Cotswolds was far greater."

Now comes up the question, What shall Maine do in the way of sheep husbandry? There is the rock. I know well that I am not capable of giving you practical details; I can only deal with general principles. What shall Maine do? What kind of sheep shall she raise? I think it is pretty clear what is the judgment of practical men on this point. I have talked with a great many farmers here, in New York and the West about it, and they all recommend just that which a member of your Board, Mr. Wasson, recommends in the admirable paper which he has written on the subject—a mutton sheep.

I think in growing sheep in this country you must throw aside all consideration of the wool. It is strange how false notions will get into mens' heads. A wool manufacturer or his agent will tell you you must grow this or that kind of wool. I tell you you can't grow any kind of wool that won't sell. Go on and manage your sheep in the way that you can get the most money from them, whether raising mutton or lambs, and let your wool take care of itself, and it will take care of itself. You must regard your sheep as machines for converting your grass and grain into wool and mutton, and to do that in the shortest possible time, you will take an English mutton sheep which fattens easily, and go for mutton. Do that and what is the result? You have a sheep that yields you a healthy wool and wool that will not break. You know a good deal of wool is spoiled by having tender places in it; so help your sheep through the tender places by using good feed all the time, and then there will be no tender places in the wool. But somebody says who will grow the Merino? Why, all the world grows Merinos. Australia and the Argentine Republic grow them by the million. England grows English combing wools, and that is what you should grow. You are close by Boston, and you are sure of a market for all the Cotswold and Leicester wool you can raise, and at high prices. Go in coolly, and as has been said here to-day, exercise your common sense. Every farmer must do that. Find out for yourselves the way to do it, and feed to make mutton, and you will get a profit in doing it, while your land is being improved. In that way you will have in sheep-husbandry an important auxiliary to fill up a place on your farm. With 54,000,000,000 lbs. of wool consumed annually, we should produce more of it ourselves, and I believe as I have stated that it is for the interest of our people to make the growth of it an incident to the growth of mutton. There is a new field and you have a chance in it. You know that a change has taken place in regard to the growing of beef, caused by an invention by which beef and mutton are put up and cooled, so that they can be taken by the car load fresh in the carcass, put in boxes and carried to England. This is making a perfect revolution in the production of these articles, and there is a demand for all we can ship. You are just in the place for availing yourselves of these changes, and you are going to make a fortune if you do it. If I knew how, I should come down here into Maine and make a fortune myself, but I don't know precisely how, and therefore I can't tell you; but the tendency of intelligent men in Maine is toward growing a mutton sheep, because that is the sheep adapted to a mixed husbandry. The Merino is adapted to a pastoral husbandry, like that of California and Australia, but the mutton sheep must continue to be the sheep for us, and it seems to me there is a demand for a movement in the direction of mutton growing.

There is one reflection that comes right home to us to-day. We cannot any of us forget that this is the 22d of February, the anniversary of the birth of George Washington. What is there that we can refer to that connects him with our subject. I have already shown what Merino sheep husbandry has done for our country. Now, George Washington was indirectly the source of it. He was fond of sheep husbandry, and he imported Leicesters, and it is said that the Leicester blood remains in that section of Virginia to this day, and that this accounts for the long wool that is to be found there. Washington had on his staff and in his family, a gentleman by the name of Humphreys, who was afterwards General Humphreys. As a member of Washington's household, he became inspired with his ideas, and among the rest with his love of agriculture. When Minister of the United States in Spain, he remembered the lessons which Washington taught him, and he sent from there the first flocks of Merinos which came to this country. In this way our flocks date back to Washington, and Washington may be said to be indirectly the source of the greatest boon which our sheep husbandry has ever received. I am glad that I brought this flag here to-day. It should be raised on every public occasion where reference is made to the Father of his Country.

That flag was called by the soldiers during the war, as you will remember, "*Old Glory.*" I am reminded of a little incident in connection with that name, which I cannot help relating. While I was a resident of Washington, a little while before the battle of Antietam, the rumor came that the troops were moving up into Maryland. I took a walk one evening in the vicinity of Gen. McClellan's house. The streets were quiet, and the moon shone so that it was almost as light as day. By and by I heard the tread of marching feet, and soon the advanced column of ten thousand men in arms came in view in the silent and almost deserted streets, showing as in the light of day under the full moon then in the ascendant. As the veterans passed me, my enthusiasm grew stronger and stronger, and it reached its height when a regiment from my native State of Maine came up with their tattered flag; and as they passed I could not forbear from calling, "Hurrah for the State of Maine! Hurrah for Old Glory!" I was a younger man than I am now, and hardly conscious that the white had begun to appear in my hair, and so I was taken a little aback at the response of the Maine boys—"Bully for you, old man!" Although a little abashed by the response, which reminded me of my declining years, I was so affected by it that I cannot recall it without a transport of patriotic feeling; and when I see a Maine man now nearly 80 years of age, who has made in his State the finest cloth shown in the International Exhibition, I say, "Bully for you, old man!" When I see his son introducting the best breed of horses, and in that way adding to the wealth of the State, I say to him, "Bully for you, young man!" When I see my friend Paris Gibson, going from Maine to Minnesota and making blankets which surpass those of English manufacture, I say, "Bully for you, young man!" When Mr. Wasson writes the best paper on sheep husbandry, I say to him, "Bully for you, young man!" When your Secretary, Mr. Boardman, shows us his admirable and exhaustive paper upon utilizing in the interest of agriculture the refuse of your herring fisheries, I say, "Bully for you, young man!" And when I see a young woman who performs her own household duties, and then goes out into the fields and pastures, takes the wild flowers, cultivates them, and acclimates them to the flower garden, and introduces to the world her treasures for floral horticulture as new treasures, I say, "Bully for you, fair daughter!"

That flag, gentlemen, symbolizes our political independence. It does more than that; it signifies the industrial independence of our country. Ten or twelve years ago our flag was made abroad. I once gave an address, right in sight of Independence Hall, and I said, "Shame on us! The very flag that floats over our forts and our ships, and over Independence Hall itself—that flag is made in England." But during the war, America said she would make her own flag, and she did it, and improved upon the making; for the stars were formerly made separately and sewed on, but now each star symbolizing a State, all the stars are woven imperishably in the web of the Union, and along with them is woven the idea of our industrial independence! Industrial independence is the key to the efforts of the Association which I represent; and I think it should be the key to the efforts of the farmers of Maine.

WHAT PRODUCTS SHALL MAINE EXPORT?

By Ira E. Getchell, President of the Board.

It is not desirable for any nation or State to be a large exporter of crude agricultural products. History does not furnish an example of a nation or people being permanently prosperous, the surplus of whose agricultural productions is exported in exchange for manufactured goods of other countries.

While the system of raising crops to be consumed on the farm, may make the business of farming self-sustaining, and may keep up the fertility of the soil, the universal raising of crude products for export is sure to impoverish our lands and lead to ruin. No system of farm management is to be thought of—much less recommended—that shall not leave our farms in as good condition, at least, as when we commenced to till them. As our State has a great diversity of industries—we being exporters to a considerable extent of the products of mines and forests and manufactured goods, the creation of which gives rise to local markets for the fruits of the soil—it may have the same significance and be as practical, perhaps, to consider the question: In what direction shall we, as farmers of Maine, increase our agricultural products?

None is so good as a home market; and if we can raise more of such products as we now import in part, to supply the home demand, it will be equivalent to the exportation of an equal amount and value of some other commodity to pay for these, besides saving cost of transportation both ways. The observance of any general maxims as to what may or should be grown for export, cannot be urged; because no rule can apply to all sections and circumstances. But we may consider some changes in our present system of farming, that shall relieve us of the necessity of exporting some of our produce, and at the same time point the way of profitably supplying many of our wants, thereby saving money to the individual and State.

In considering the subject of exportation, the question of first importance is, which of our productions can best be spared without committing robbery upon the great stores of nature, the fertility of our soils? In agriculture as in piety, faith and works must go together. What I mean is, faith in farming as a profitable occupation, such faith as wins. Much of the farmer's work is done in a faithless spirit. We fail to reap the advantages within our reach—we do not realize the agricultural capacity and possibilities of our State. About forty per cent of the workers of our State are tillers of the soil. Yet it is doubtful if much more is produced than will feed our own population. True, many who are reckoned farmers are engaged in other occupations, and farm only at odd jobs. This will reduce the percentage somewhat and make the showing not quite so bad. In Great Britain only six and one-half per cent. of the population—or one in sixteen—is engaged in agriculture; yet this small proportion of producers furnishes one-half of all the breadstuffs consumed in the kingdom.

Theorizing is a favorite but unprofitable occupation. We reason that if the farmers of Minnesota and California can raise their thousand acre fields of wheat without manure, and at a very small cost, it is useless for us to try to compete with them. If corn can be grown in Illinois for ten cents per bushel, what folly to think of growing it in our cold State! If Texas steers can be bought for $4 per head, fatted on Illinois corn at ten cents per bushel, and sent from Chicago to Boston for forty cents per hundred, we cannot raise stock in competition. So with pork, wool and other products. Now at the risk of being charged with egotism, I will make the assertion that we can raise all these western products in our own State, in as great perfection as can the West—and that too profitably. And this we should do at least to the amount sufficient for our own consumption; and though I may be called old-fogyish, I would recommend that we live more within our own resources—that we consume less St. Louis flour, less Illinois corn and pork, and less Texas beef.

We should realize the fact that Maine is rapidly advancing in prosperity. Consider her manufactures of woolen and cotton goods, of boots and shoes, her lumber, ice, granite, lime, slate and feldspar. The continuous and steady growth of these interests, and the fact that they have withstood business depression and hard times, prove that they are as permanent industries of our State as agriculture itself. And the growth and development of these and other industries is a guarantee in the future that Maine will not be obliged to export the products of her soil, but will find better markets at her own door.

There is invested in the State, in farms, tools, machinery and live stock, $131,000,000—more than three times the capital invested in manufactures; and our annual farm products are worth $33,500,000. There are employed in manufactures 62,000 persons, in agriculture 82,000. This fact shows the latter to be the leading industrial pursuit of our people.

Now if Maine can raise her own breadstuffs profitably, why ought she not to do it? Her population is about 627,000, and assuming that each inhabitant consumes annually five bushels of wheat, or its equivalent in flour, she would require more than 3,000,000 bushels of wheat per year to supply the demand for bread. We raise less than 300,000 bushels, one-tenth of the amount consumed, leaving 2,700,000 bushels to be brought from beyond the State. Reckoning the price at $1.60 per bushel, we send out of the State annually for flour more than four million dollars. And one of the worst features of this exhibit is the fact that quite a proportion of this enormous sum—hardly less than one-fourth of the whole, or one million dollars—is paid by the farmers themselves.

The soil and climate of Maine are adapted to the growing of wheat. There are but five States outside of New England that average so many bushels per acre as our own, and no State where wheat bears so high a price. Great Britain with an area only three times as large as Maine, where the annual rental of much of her land would buy an equal amount here, with soil naturally no better than ours, with only six and one-half per cent. of her population engaged in agriculture, raises one hundred million bushels of wheat annually. This they grow from three and one-half million acres of land, the average being nearly thirty bushels per acre. Now they obtain this surprising result not through any advantages they possess that we do not have in Maine, but from necessity. They believe it can be done; and they go to work and do it. The business is conducted with the greatest skill. Chemical manures are used to the amount of half a million tons. Fleets of vessels are employed carrying guano to their shores. Their sheep number thirty-three millions—as many as we have in our whole country.

These facts are mentioned to show the possibilities in agriculture and the ease with which we can raise our bread, and even become exporters.

Now let us review our present mode of raising wheat and see if it is not profitable. In 1870 Maine's wheat crop averaged fourteen eight-tenth bushels per acre, and the price was $1.78 per bushel, making our wheat fields worth $26.34 per acre. The same year Minnesota wheat fields were worth $12.60 per acre; and California, whose annual wheat product is worth more than her gold, and whose prices are higher than in any other wheat exporting State, held her wheat at $5.50 per acre less than ours. In the nine wheat exporting States which raise more than ten million bushels annually, the average yield per acre is one and one-tenth bushels less than in Maine; the average price per bushel one dollar, while in this State $1.78 is obtained.

These statistics prove that we have to pay the highest prices for the two and three-quarter millions bushels we import; that our soil and climate are favorable for raising an amount per acre above the average; and that the only reason why we do not raise bread enough for our own consumption is because we do not sow the required number of acres. The same arguments will apply with equal or greater force to the corn crop; for though there have been years when it was not profitable, or even advisable, to grow wheat, on account of the ravages of insects, there has seldom been a year when a paying crop of corn has not been raised in all except the most northern sections of our State.

There is no more beautiful sight than a large crib of yellow corn, and certainly there is nothing of so much value to the farm. It makes the machinery run easily during the whole year. It means the fattening of pork and beef; it means heavy sheep and lambs and sleek horses; an increase in the production of butter, cheese and eggs; and, best of all, it means a large and valuable amount of fertilizer which insures a bountiful crop for the future.

While admitting that concentrated fertilizers may be profitably applied to special and even general field crops, if they are used intelligently, yet, if all farmers who raise corn, hay, potatoes and other bulky crops—cultivating large areas of land—would invest their surplus money in corn to be fed to stock on the farm, instead of buying guano, superphosphate and the like, I have no doubt a few years would show a decided advantage in favor of corn.

Maine plants about 35,000 acres of corn, and harvests rather more than a million bushels. We buy a million (I do not dare to call it three millions, though I think the facts will warrant) bushels more, for which we pay $750,000. This we should raise in our own State, and feed on our farms. During the last twenty years Maine has more than doubled her yield of potatoes; in the next I predict she will double her corn crop.

In riding from New York to Philadelphia by rail, we pass through the entire width of the State of New Jersey, which is indeed the garden of America. The general surface of the State is level, the soil is light, warm and easily cultivated. We behold the large herds of cows, the fine stables of milkmen, and the broad acres of the market gardener. These we expect to see, but are surprised at the immense amount of corn that is cultivated. We may almost imagine ourselves on the western prairies. True, New Jersey farms are not large like those of the prairie, but there is corn here and corn over the fences as far as we can see. And we ask ourselves the question: Is not this land too valuable to grow corn upon? The State has about a million inhabitants; the city of New York, across the Hudson, on the east, has a million; the city of Philadelphia, across the Delaware, on the west, has nearly a million more. The State is about one-fourth as large as Maine, and while we raise one million bushels of corn, New Jersey raises ten million annually—and that, too, though situated in the immediate vicinity of the two largest cities and markets on the continent, with land worth $500 per acre and upwards, and stable manure $10 to $12 per cord. In 1870 the price of corn averaged in Maine $1.14, in New Jersey 81 cents; in 1873 ours was worth 91 cents, theirs 62 cents. A stranger would say at once that either we could not raise corn in Maine, or were engaged in some more profitable business. The statement of our inability to raise corn is confronted by the facts that we know that our home grown corn is several pounds heavier per bushel, and of better quality than the western, and that our average per acre is the same as theirs—33 bushels. Let every Maine farmer ask himself the question: Can I engage in a more profitable business than growing corn?

Sheep husbandry, one of, if not the most important of all branches of stock raising, does not receive the attention which its merits demand. Mutton and wool are food and clothing. There is a constantly increasing demand for these, and the supply is of world-wide importance. Russia, the land of the North, during her long cold winters feeds 45,000,000 of sheep; Great Britain, with an area but little more than three times as large as the State of Maine, has 30,000,000; and her colonies increase the number to 100,000,000, from which she supplies her looms. Great Britain also furnishes our own manufacturers with one-third of their wool. France, with a population of 40,000,000, on an area less than the State of Texas, whose ten million farms average less than eighteen acres each, finds it profitable to keep 25,000,000 sheep. If Maine owned as many sheep per acre as densely populated France, instead of 400,000, we should have 4,000,000. If we kept as many as Great Britain we should have nearly 10,000,000 sheep.

The statistics of crops, stock raising, &c., of England are referred to, because they are carefully gathered; because her experiments are skillfully made, and her whole system of agriculture carried to a high degree of perfection. It may not be advisable for us to adopt all these practices where conditions are different; yet there are many facts we are liable to overlook in our practices, and a glance at our neighbor's ways of doing things may not be unprofitable.

The chief animal production of Great Britain is sheep. The number of this kind of stock reaches 33,000,000, while only 5,000,000 neat cattle are kept. Her most fertile and highest priced lands are stocked with sheep. It is the basis of English agriculture; sheep are kept to enrich their land. The profit from such a course we almost entirely overlook, and nearly lose in our present practice. If we pasture hillsides and broken land that cannot be plowed, we lose what in England is reckoned one-third of the profit. Let me suggest a course which I have practiced to advantage. Increase your number of sheep so that your pastures will hardly carry your flock; fence off the number of acres you intend to plow two years hence; turn your whole flock into this inclosure one day each week during the summer. The change will be grateful to the sheep; they can do without water one day, if necessary, and you will be doubly repaid in your first crop. For our old fields that have been cropped continuously year after year, there is nothing, in my experience, which will produce a renewal like a few years rest and enriching by pasturing with sheep.

England raises no Merinos. Such wool as is needed to supply a rapidly growing demand both in that country and this—combing wool—is grown. In 1857 England manufactured $90,000,000 worth of worsted goods; in 1864 she exported very nearly that amount. This country has been, and still is, a large customer for these goods. While we import $9,500,000 worth of other woolen cloths, there are $16,500,000 worth of their worsted goods annually brought to this country. This, however, is not going to continue. There is, perhaps, no one of our manufacturing interests growing more rapidly than the manufacture of wool. In 1860 we had 3,209 setts of woolen cards in operation; in 1870, 8,386—an increase in ten years of 250 per cent. In this prosperity Maine has her full share. In 1860 she had 80 setts woolen machinery; in 1870, 321 setts, thus in ten years the number being quadrupled.

Though Maine produces one and three-fourths million pounds of wool annually, her woolen mills consume seven and one-quarter million pounds. During the last decade the number of sheep in the State diminished eighteen thousand, while the manufacture of wool increased four-fold. This is not as it should be; for not until Maine can supply her own mills with wool, as well as her operatives with bread, can she reap the full benefit of these industries. To do this we shall be compelled to increase our number of sheep to 1,800,000—about one-third as many as the State of Ohio now owns, and about one-fifth as many per acre as Great Britain has.

There is one other subject I wish to refer to. It is the manufacture, care and application of manure and fertilizers. It may not belong to the question, yet it is a matter inseparably connected with all our farm operations; one upon which depends the results, the success or failure of our farm management; on which depends the answer to the question as to whether we raise a surplus of products for export or even sufficient for our own consumption; a matter, withal, that receives very little of our attention, in which there is more neglect and waste than in all others. Indeed, the first and important question we should ask ourselves after removing a crop from our land, is how to restore and keep up its fertility. If we can profitably sell hay, potatoes, grain and other gross feeding crops from our farms, and keep up their fertility from outside sources, all may be well. If we depend upon home resources for our fertilizers, we must sell beef, pork, mutton, butter, cheese, eggs and wool—such as seems best suited to our different individual conditions and circumstances.

There has lately been a series of valuable and interesting experiments with fertilizers conducted at the Massachusetts Agricultural College. Crops and soils have been analyzed and formulas prepared, showing what elements are usually wanting in soils to grow the different crops in perfection. Experiments have been made on a great variety of crops on many thousand acres, with uniform and remarkable success. Now, without buying a ton of the Stockbridge fertilizers, we may learn valuable lessons from these trials. We learn that plant food comes very largely from the atmosphere—from 90 to 95 per cent.—that only the mineral or ash constituents and nitrogen come from the soil; and chemistry teaches us that these are contained in their most available form in barnyard manure. But the most important lesson to be learned is the great value of these elements and their liability to waste. If we buy a fertilizer containing one pound of nitrogen, it costs thirty cents or more; and however chemists may differ in some matters, they all tell us that nitrogen is constantly escaping from manure heaps and all decaying organic substances. Now, every one in the State who cultivates well a farm of 100 acres and consumes most of the crops on the farm, manufactures during the year (or should with care and economy) from two to three hundred dollars' worth of manure. The farmer harvests his corn and grain, carefully measures the number of bushels, secures them in boxes and bins and estimates their value. But his manure, in too many instances, is carelessly thrown out doors, to be dried by sun and wind and leached of nearly all its valuable elements by the rains. I believe that if the farmers of Maine would use proper absorbents and save all the manure now made in the State, without adding thereto from outside sources, and apply the same properly, our wheat and corn crops would be increased a million bushels annually.

The venerable Josiah Quincy once being asked what he considered his most profitable farm crop, replied, "My manure heap." A successful Connecticut Valley farmer (Col. Colt) told me not long since, that he had used chemical manures profitably; but he considered stable manure much cheaper. His method of manufacture was this: in early winter he buys twenty or more head of cattle, feeds them on Maine hay and Illinois corn about four months, and sells them for beef. "Then," he says, "if I don't lose more than ten dollars per head on my cattle, I consider the investment a good one."

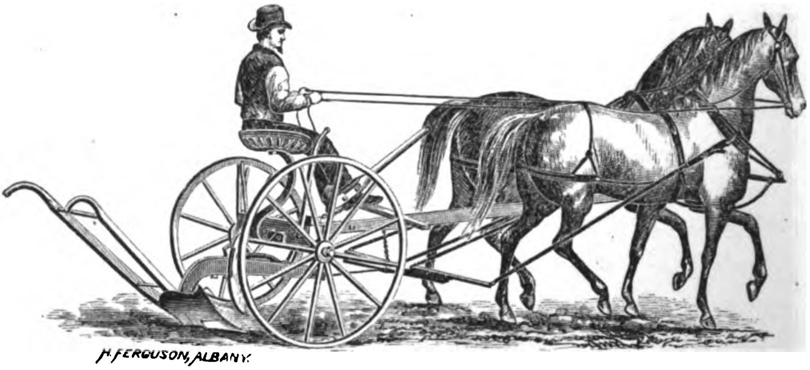
Some of the exports from our State are suicidal in their tendencies. Boston dealers in fertilizers are constantly advertizing for sale, car-loads and cargoes of wood ashes to arrive from Maine. Our corn, potatoes and other crops require considerable quantities of potash in their growth, and there is no source of supply so available as ashes. Our new lands owe their fertility largely to the supply of ashes they received from the burning of forests. Our crop of potatoes which is worth more than $1,500,000 annually to our State, and which is more than twice as valuable per acre as any other crop we raise, removes much potash from the soil. Hence arises the great objection to our raising and exporting potatoes in unlimited quanties. Truly, to send our ashes out of the State is killing the goose that lays the golden egg.

There is another interest in the State that has grown in the few past years, from small beginnings, to be a large source of revenue, and an industry from which the farmers of Maine should reap great benefit. I refer to the menhaden fisheries.

I get the following statistics from reliable sources: Number of sailing vessels engaged in the fisheries, 800; steamers, 200. Number of hands employed, 4,600. I cannot get correct information in regard to the value of products, but probably it is near a million dollars annually. After the extraction of the oil there is left as refuse a valuable and powerful fertilizer, very rich in nitrogen, which of late is dried by heat and barreled. At least nineteen-twentieths of this is sent out of the State. It is sold at present at $10 to $12 per ton, and shipped to Georgia and the Carolinas. There it is mixed with South Carolina phosphate and applied to their cotton fields. All who have any knowledge of this matertal, pronounce it very valuable; and I think it a legitimate matter for this Board to make experiments with this fertilizer, to obtain its value as compared with other manures, and report whether it is not the part of wisdom for us to consume a part of this manure at home, and to export the agricultural products grown from it.

It may perhaps be expected that, in presenting a paper like this for your consideration, some specific course will be submitted for adoption; and to cover the points suggested in this paper, I recommend that for the promotion of the best interests of the agriculture of our State, it is desirable to increase largely the number of our dairy cows and sheep. This will directly make up all deficiencies in the production of butter and cheese, if any, and leave a surplus for export; will increase the amount of meat and wool; and what is of no less importance, supply our soil with food which shall place the bread raising capacity of our State on a permanent basis. Gentlemen, I submit these suggestions for your consideration.

In conclusion, let us accept with thankful hearts, the gifts which the God of Nature has lavished upon us and our State. Let us fully appreciate the value of our noble forests, the wealth of our mines, the inexhaustible power of our grand rivers in their course to the sea, the permanent advantages to be derived from the sea-coast, commerce and fisheries. And when we look to sections of our country that may seem to have superior advantages of soil and climate, but are, and always must be, deprived of these other advantages, let us, as we have a right, be proud of our native State, believing that the steady growth and prosperity of her manfacturing, commercial, mining and other diversified interests, will secure for her agriculture an honorable and profitable position in the future; and that ours, indeed, is a goodly heritage.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PAPERS AND DISCUSSIONS

PRESENTED AT THE

SEMI-ANNUAL MEETING AT ALFRED, Oct. 16th-18th, 1877.

MANURES.

In arranging a programme for the autumn session, the committee on topics, at the last annual meeting, believed that some time could be profitably spent in considering a few of the points relating to manures, which have not been so generally discussed as have some of the more leading features of this most important subject. They accordingly decided upon four subdivisions of the same, embracing the topics presented in the succeeding pages, which are given from the manuscripts of those to whom they were severally assigned, together with the discussions called out by the reading of the papers. The essays do not claim to be exhaustive of the various heads, but are rather suggestive, as indicating the importance of the points brought up, and the great need of their receiving more attention from farmers, and more thought from our agricultural writers. They were presented on different days of the Convention, but for the sake of unity are given in this connection in the order in which they were presented:

I. Imports and Exports.

By D. M. Dunham, Bangor.

When our farmers were clearing the forests and raising heavy crops upon virgin soil, little or no manure was needed; consequently the natural sources of supply were either largely overlooked and suffered to go un-utilized, or the supply was gathered and shipped to older States. Not many years ago, nearly every town had a place at which to make potash, and the ashes were carefully saved and sold at from ten to twenty cents per bushel, the potash sent away, and the leached ashes, very generally, were not considered of sufficient value to the land to pay for carting them away from the potash factory. This business now is nearly abandoned, and the ashes either used upon the farm or sold to the soap maker. From Bangor there is now shipped to other States 45,000 bushels of leached ashes, at one shilling per bushel. One of our soap makers claims that the leached ashes are worth more for the land, bulk for bulk, than unleached. Whether this be so, or whether it is a product that he has to sell and wants to make appear a little better than it is, is a point I will not attempt to decide. It takes about two bushels of unleached ashes to make one of leached, and the total amount exported from this State is believed to be about one hundred thousand bushels, annually, from which is received $16,000.

As near as I can learn from those engaged in the business, about one hundred tons of bones are shipped out of the State, at about $20 per ton, making a total of $2,000. These bones are largely brought back again mixed with a little ammonia, and a good deal of very cheap material, and sold at about $40 per ton. Thus we see, that we pay a very fair profit to somebody for "rattling our bones." The bones that are shipped are very generally gathered by street children in our cities, and as they would but for this go to waste, they may indeed be looked upon as acting a quite important part in our public economy. The annual production of bones from our tables is nearly seven thousand tons, and my belief is that by far the larger part of them go into the rubbish heap, notwithstanding the quantities gathered by poor children. If these could be mixed with ashes and kept moist for a season, they would make a very respectable quantity of fertilizer.

By far the largest export of fertilizers shipped from our State is by the Cumberland Bone Company and the Menhaden Oil and Guano Association. The former company shipped to the South last year about 2,800 tons of phosphate, at $38 per ton, or a total of $106,400. The same company shipped nearly 25,000 tons of porgy chum, at $12 per ton, making $300,000. The Menhaden Oil and Guano Association, embracing most of the factories in the United States (which are however, nearly all located upon the coast of our own State) reports about 50,000 tons exported, making at the above price $600,000. These, with the amount exported by the smaller factories upon our coast, would not vary greatly from $1,000,000, annually. It is claimed by our fishermen upon the coast, however, that this business is carried on in such a way that the lion's share, at least, goes into the coffers of parties who are not our own citizens.

To recapitulate, we have as our total exports of fertilizing materials, the following:

Ashes,	$16,000
Bones,	2,000
Phosphate,	106,400
Porgy chum,	1,000,000

Making a total valuation of manures exported from our State in a single year, of one million one hundred and twenty-four thousand four hundred dollars' worth.

It is much more difficult to ascertain facts in regard to the importations of fertilizers into Maine. In fact, after the most diligent inquiry and correspondence, I have been unable to reach anything that is at all satisfactory. The channels are so many and varied, and the supply received from so many sources, and so much depends upon the persistency of the agents who go through the country to sell it, that I shall only attempt to make a few figures and let you take them for "over" or "under."

Estimating phosphates of the various kinds at five thousand tons, at $40 per ton, and we have $200,000, paid out for this one fertilizer. C. L. Bartlett & Co., agents for the Peruvian Government for the sale of guano, write me that they sell about one thousand tons to come to this State, at $60 per ton, making a total of $60,000. They write, also, that the sale here is increasing. The amount they claim as sold here is more than I had supposed was the case. The Pacific Guano Company say they sell nearly thirty thousand tons in the United States, about fifty tons of which comes to this State, at $50 per ton, or $2,500. The agents say they expect to sell much more here the coming season. About fifty tons of the Stockbridge fertilizers were sent into Maine last season, at $40 per ton, or a total of $2,000. Some twenty thousand tons of plaster rock is imported, at $3.00 per ton, or $60,000. This is doubled in price before it goes into the hands of consumers; the additional price, however, assumes the nature of a home industry, and should not be added to the cost of imported fertilizers. Thus we have as a summary of imports, the following:

Phosphates,	$200,000
Peruvian guano,	60,000
Pacific guano,	2,500
Stockbridge fertilizers,	2,000
Plaster,	60,000
Total,	$324,500

Or, in other words, we export $1,124,400 worth of fertilizers annually, and import $324,500 worth, making a balance in our favor of $799,900. But, taking the advice of the old farmer to his son, never to run in debt, but if he had such a desire to be in debt he could not possibly get along without it and run in debt for manure—then the above balance is against us.

DISCUSSION.

Mr. GILBERT. The paper has brought out some points which are worthy of our serious consideration. Generally it is a matter for congratulation if our exports exceed our imports, but it is not so in this matter, for the excess represents a drain upon our resources which ought to be utilized for the benefit of our hungry soils. But assuming, what I do not doubt, that in the preparation of the paper the gentleman has kept on the safe side, the figures which he has given do not represent our entire loss, because so much of the material as is returned to us we purchase at a price very much enhanced above the price of the crude material which we sell. What is sold, is sold for $10 or $15 per ton, incorporated with material which is perhaps of less manurial value than itself, and sold at from $40 to $50 per ton. The question is ever recurring to us, if we ought not to stop the exportation of so much of this crude material? and in my opinion we might reap large advantages from such a course.

Mr. FLINT. It is impossible for us to get anything like approximate statistics on this subject, for a number of reasons. The porgy chum, for example, is made from fish that come to our shores, and may be said to belong to all the world; and it is manufactured largely by parties out of the State, so that the amount received for its sale goes largely to citizens of Massachusetts and New York. To offset the ashes and bones which are carried out of the State, we have the manures made from the consumption of corn, shorts and flour brought from the West. But while we can come at our importations and exportations only to a limited degree, I think it is apparent that much money goes out of the State which should be retained here. The object of the maintenance of this Board is to make our agriculture self-sustaining, and that can only be when we have learned to utilize to their fullest extent our agricultural resources.

Mr. LELAND. I will speak on only two points: the exportation of ashes and bones. In exporting ashes, we are sending away material which it is very important that we should keep at home. Potash is one of the most essential elements of plant food, and one which has been largely withdrawn from our old soils, and our crops are much diminished for the want of it. Then in regard to the exportation of bones: you have all noticed how our animals, and especially our milch cows, seem to be suffering from the want of bone material. This is sometimes remedied by feeding bone meal. It indicates the exhaustion from the soil of another important element, phosphate of lime; and it should be remedied by using the bones we are sending away. These two elements of which I have spoken, are probably those most quickly exhausted from the soil, and the money returned is nothing like an equivalent for their value which is thus lost.

Mr. Reynolds. There are a good many of our pastures that have been fed for a hundred years. I have one that has been fed for seventy-five years, and I have a pair of steers three years old that have been always pastured in it. I have seen them pick up and chew bones, which they seem to crave. Why is it? Because there is a lack of bone material or phosphate in the soil. I notice the same thing with my cows, and I think the bones should be all saved and used in Maine.

Mr. Ayer. The point made by the gentleman from Somerset is one which I think worthy of further attention. The importation of grains from the West is something about which much complaint has been justly made. Nevertheless, there is a redeeming feature in the enhanced value of the manure. I know that many of the best farmers of New England are feeding grain, and especially shorts, on account of the increased value of the manure heap. When we consider the constituents of shorts we see that it has a large value in that respect. I read recently in an agricultural paper, the result of an experiment in the use of shorts as a manure for corn. It was used side by side with superphosphate and barnyard manure. The result was, that the shorts were the most valuable manure. The price there would of course be much less than here; perhaps half the cost here represents the price of transportation. This becomes a very important matter to consider, when we complain of these importations from the West. I think there is no reason why we should not import grains when we have not enough, and when we can feed them to our animals at a profit.

Mr. WILLIAM EMERY of Alfred. In our section we know but little about the exportation of manures, because we have none to export. Our ashes are mostly used here at home. We know the worth of them, and instead of exporting them our farmers buy them. A good many ashes come into this town every year from the manufacturing establishments of Massachusetts. I have at times examined these ashes that are brought here and found them of very little worth. They are made from loose material, like sawdust, and I have thought at times that coal ashes were largely mixed with them. I don't think it is profitable for our farmers here to buy a great deal of them for manure. I am inclined to think that about as many bushels of ashes are brought into the State as are sent out of it, but I think that those we buy are not worth a quarter as much as those we sell.

In regard to the fish chum, I have but little confidence in it as a manure. I think it would be best for us to manufacture it right here at home, so as to get as much money out of it as we can. I think it is best to stop the importation of manure by making and saving what we need at home. Most of our farms are pretty hilly, and it is evident that a good deal of the elements of fertility has washed down from these hillsides into the hollows. Almost every farm has more or less of such accumulation, in one form or another, and it seems to me that the greater number of farmers do not appreciate them. Then I think that farmers are neglecting the first principle of making manure. Farmers used to keep large stocks of oxen, cows and young cattle. Now, in many districts, you can't find oxen enough to break out the roads in the winter. I think with proper management there would be no necessity of bringing a single article of manure into Maine.

Vice President HARRIS inquired if Mr. Emery had ever used any porgy chum.

Mr. EMERY answered that he had not.

Mr. HARRIS. I have had some experience in using it, and have procured it for others, who have transported it for greater or less distances, and have done a good business with it on their lands. One gentleman in particular, whose farm is fifty miles back, would not do without it if it cost $50 per ton. He has tested it, and knows what he is talking about. I have used ten tons of it per year, myself, and I think I know that it is good. Properly composted it gives you a first-rate manure. It is rich in nitrogen, the most costly fertilizing element. I think any man who uses it intelligently and wisely will find its use profitable. If our farmers understood its value, Bradley would have to pay more for it than he does. It is carried out of the State simply because there is not a home demand, and there is a demand abroad.

Mr. KYES. I think there are some other exports of our farm commodities which are injuring our farms very much. One is, in shipping potatoes. It is my experience, that farmers cannot live by raising potatoes at the prices they have sold them for the last five years, and buy even porgy chum or ashes at the prices obtained for them, to raise them on. Then on many farms they sell hay; and what farm is there that will bear to have the hay sold off of it? Potatoes carry off more fertilizing material than anything else. I know we must export something, but would'nt it be better not to export so many potatoes, and save our dressing for something else? As has been said, we ought to manufacture to the highest point whatever we sell, and not sell in the crude state, as we do many of our articles, such as porgy chum, and some other things.

II. Liquid Manures.

BY GEORGE FLINT. NORTH ANSON.

The subject of liquid manure is not a new one. It is as old as the manure question itself; and has received attention from many thoughtful men, but by the great majority of farmers it has been sadly neglected.

Very few know the value of the urine of our domestic animals; and it would doubtless surprise the most shiftless farmer to learn that the greater part of the fertilizing elements from his farm stock has been allowed to waste, through ignorance of their value, or carelessness in handling them. The present average fertility of the farms of our State, when compared with that of former years, proves conclusively that there is somewhere a very great loss of fertilizing material. Thousands of acres on our hill-sides, and in our once fertile valleys, attest this fact. So great has become the impoverishment, that it has attracted the attention of scientists, who have come to our relief, and by close study, analyses, and patient investigation, have discovered the principles of plant life, and the requisites of plant nutrition.

Every plant has to draw for its support from both the soil and the air; but as the air always furnishes its part without our aid, it is not within our province to take it into account. The only properties for us to consider, are those derived from the soil. By examination they are found to be principally potash, nitrogen, and phosphoric acid. These the plant must have, and the soil must supply them. This is no new theory. The German chemists have given the subject much attention, and from their tables, and from the estimates of others, Prof. Stockbridge has prepared formulas for our principal crops. For instance: corn requires, to produce fifty bushels and the necessary stalks, of potash 77 pounds, nitrogen 64 pounds, and of phosphoric acid 31 pounds; and these elements are appropriated in about this proportion.

Generally speaking, the farmers of the past have used manures only in a solid or bulky form, neglecting in a great degree the liquid portion of animal excretions, an analysis of which will show at a glance their value.

By the authority above quoted, the urine of a horse contains, in a thousand pounds, of potash 15 pounds, and of nitrogen 15.5 pounds. The urine of a cow, the same quantity, contains of potash 14.4 pounds, and of nitrogen 5.8 pounds. The solid portion of the horse contains, of potash 3.5 pounds, of nitrogen 4.4 pounds, and of phosphoric acid 3.5 pounds. The solid portion of the cow contains, of potash 0.1 pounds, of nitrogen 2.9 pounds, and of phosphoric acid 1.7 pounds. The age of the animal and the kind of feed varies the result; but the average is not materially changed. A growing animal appropriates the materials required to form the bones, muscles, skin, &c., which a mature animal must throw off in the excretions, thus leaving the excrements of a mature animal richer in certain elements than a young and growing one.

The value of these ingredients at the market price, as rated in the commercial fertilizers, shows the urine to be of the greater value. The amount of urine, or of the solid portions, varies greatly in amount. At a safe estimate, the cow voids of urine 13,000 pounds, and of solid 20,000 pounds in a year, giving in the urine one year, of potash 182 pounds, of nitrogen 75 pounds; in the solid one year, of potash 70 pounds, of nitrogen 58 pounds, and of phosphoric acid 34 pounds. These amounts, at the market price, gives as value of the

Liquid portion - - - - - -	**$33.31**
Solid portion - - - - - -	**20.10**
A total of - -	**$53,41**

as the commercial value of the entire excrement of the cow for one year, at the same price we pay for concentrated manures, viz: potash 8 cents per pound, and nitrogen 25 cents per pound, without giving credit to phosphoric acid. The liquid portion is easily and readily decomposed in the soil, and is in proper form for plant food; while, in the solid much of the elements of fertility is in an insoluble condition, requiring time and the chemical action of other materials to disintegrate them and prepare them for use.

The leechings of manure heaps is another form of liquid manure. It is used to a great extent in China, and many of the older countries where they want the quickest results. Soap-suds, and all wastes from the kitchen sink, contain potash and many of the elements required, in smaller quantities, as lime, soda, salt, &c.

When we consider that in the main all this supply of manure has been allowed to waste for generations, is it any wonder our fields should want the elements of life; or that the owner should be called to send abroad for materials to supply the deficiency? Taking the entire waste of the shiftless farmer, it will amount to this, that three-fourths of his entire manure runs through the stable floors, or off in drains. It is soaked out of his heaps by the rains, and after it has washed and leached, dried, and leached again, it is carted off and called manure.

The methods of saving it are various; but the most practical, and consequently the best one, is to use absorbents, and move it in that form. As this properly comes under the head of composting, I will leave it to be considered under that subject, charging you to keep in mind that any method, at almost any cost, is preferable to sending out of the State for commercial fertilizers.

DISCUSSION.

Vice President HARRIS. This is a question that interests the farmers as much as any that can be considered. The statement has been made, backed by good authority, that the liquids voided by domestic animals are worth more than the solids. I think I have reason to believe that this statement is correct in my own practice. The question is now before the Convention for discussion.

Mr. AYER. I will relate the result of an experiment made by a friend of mine; to do which I shall have to tell you the way he preserves his liquid manure. Few farmers are able to build an expensive cellar; but this one of his was such a one as most any farmer can put under his barn. He raised his barn up about three feet, and fastened it securely with stone, then excavated under his cattle about three feet more, and built a drive-way, so that he could drive through. You will see that he didn't make his cellar hardly deep enough, but that was the way he did it. In the fall of 1875 he put into that excavation about ten cords of swamp muck, or swamp mud, of not very good quality; and the next June, after taking out his first year's manure, he put in about as much more of the muck, and with a view of ascertaining the relative value of the solid and liquid portions of the manure, he threw the solid manure under a shed which he had, and allowed only the liquid portion to go down on the muck. His cattle were housed at night during the summer, and the material was forked over from time to time until winter, when much could not be done with it because it froze. In the spring of 1877 he hauled it out and put it on an acre of land prepared the fall before by plowing in the usual manner. One-half of it was sown to wheat, the other planted to corn, the dressing for the wheat applied broadcast, that for corn in the hill. An adjoining acre, dressed with an equal quantity of well-rotted barnyard manure, was planted one-half to corn manured in the hill, the other half to wheat, manure applied broadcast and harrowed in. The result was, the half acre of wheat dressed with the muck and urine yielded 18 bushels, the half acre dressed with an equal amount of solid manure, 12 bushels. The half acre of corn dressed with muck and urine produced 80 baskets sound corn, that with yard manure 50 baskets. Now, gentlemen, you can try it for yourselves, and see whether this experiment proves the truth of the statements which have been made as to the value of liquid manure.

Now, when we consider that not one farmer in ten has made preparations to save the liquid manure or the washings of the manure heap, and that a majority of the farmers in Maine are buying large quantities of commercial fertilizers, it seems to me we have something to think of and something to do. Is the conclusion of the paper, that we have been losing three-fourths of the value of our manure, correct? I think it is. I believe that the authorities say that the liquid portion of the manure is three-fifths of the whole in value, and I think the loss sustained by the washing of the solid portions bring the entire loss up to three-fourths of the whole. Now, if we have done this it is no wonder we have been compelled to pay out enormous sums for fertilizers to make our lands produce. I do not doubt that Mr. Dunham was correct so far as he went, but I do not believe he got one-half of the amount paid out for commercial fertilizers in the State of Maine. I was talking with a dealer the other day; the conversation was not commenced by me, nor was it with reference to this subject, but he was pleading poverty. He said he had sold $2,300 worth of Bradley's and the N. E. Co.'s superphosphates, and had collected only $200, one-half having been due this month and one-half in June. Our farmers have not as many potatoes to spare as they had last year, and they have no promise of getting half as much per bushel. These facts ought to teach us a lesson. As was said this morning by Mr. Emery, we ought to learn to depend on our home resources; and I believe if we would save and use our liquid manure we should not need to buy these commercial fertilizers, nor to look after this porgy chum. The best farmers in our vicinity have been saving, and their farms look better for it; but few of them have been led to do it because they were aware of the great loss they were sustaining, for few farmers know what chemical analysis has proven and scientific knowledge has demonstrated in regard to this subject.

Mr. VARNEY. I have had very little experience in general farming, my use of manure having been in my business as a nurseryman and florist. Years ago, however, I became fully persuaded that not one farmer in five hundred in the State of Maine was making a proper use of his manures. Some years ago I found that I was making more dressing, and adopted the system of using some kind of absorbent for the liquid portion of my manure, and I found that I was gaining year after year; and the statements which have been made in the paper are in complete accordance with the conclusions which I arrived at years ago. I do not know that it makes any difference what we use as an absorbent, if we succeed in saving the liquid manure and put it in such a condition that it may be taken up by plant growth. It seems to me that quick returns are needed in farming as well as in the commercial world, and I have no doubt that it would be well for us to adopt such methods for converting our manures into liquids as would enable us to make a direct application of them to the soil in liquid form. I like the remarks which have been made in regard to the importance of utilizing our own resources. I believe if proper use was made of the material within reach, every farm would be growing better instead of growing worse. The first thing needed is such an improvement in our stables and their location as will enable us to save the entire bulk of the solid excrement as well as the liquid voidings of the cattle. If it were anything else in the world but manure, farmers would be sure to save it. They are not careless about many things, but as has been said, not one farmer in ten seems to act as if he had the least knowledge that there is any value in liquid manure. If I have a plant that is sickly, I do not give it manure in a solid form, but make a liquid preparation, and in a week's time I find it lifting up its head and rejoicing. As has been said, we don't use half the manure we have, and before we import we ought to see to it that we make a judicious use of what we have. I remember that in talking with my sister, Mrs. T. S. Lang, who resided in Paris a year, that she said that when riding about the city parks, or out of town, when the horses voided their excrement in the street it was no uncommon thing to see the women run out and gather it up, to be used in growing flowers. What wonder is it that they beat us in that department? If we had some of the same spirit here our farms would not be running out as they are to-day.

Vice President Harris. This illustrates a leading propensity of the French people, to save; and when we find that the greater part of the elements of fertility are going to waste we ought to be willing to take a lesson from them. We want to impress upon our people the importance of saving and applying our liquid manures.

Mr. C. B. Lord of Alfred. With any intelligent man who has given the subject any thought, or had any experience, there is no question about the great value of liquid manure. As to the best methods of securing it there may be differences of opinion. My own experience has been somewhat limited, but I have had experience enough to lead me to believe that the means for saving the liquid manure, both from house and stable, are within the means of every one who cares to do it. My own plan is this: I have a conductor behind each horse and cow stall, which (the floor beneath the slat-work in each stall being a little inclined) receives the urine, and conducts it into the middle of my manure shed, which is outside of, but attached to my stable; and if any person has any severe doubts in regard to the advantages of this method, I think if he had been present when the shed was cleaned out a few days ago he would have been convinced of the strength of the manure. As has been said, we do not realize the importance of this matter, and I hope that ideas may be gained here which will lead our farmers to take the subject into immediate consideration.

Mr. John F. Hobbs of Alfred. I have always considered liquid manure very essential to the farm, and have tried to save it. A few years ago I was convinced of its value a little more fully than I had been. Near my barn there was a hole which had been dug out by digging out manure for years, and in it were several hogsheads of water which had washed from the yard and under the barn. It was in the fall of the year, and the water was not so strong as it would have been in the spring. I got a hogshead and hauled it out into the field, on a very poor piece of grass land, and emptied it, about a half hogshead full in a place. It was on a side hill, and run down. The next year, where I turned the water there was a good swarth of grass. In some places it grew so stout it lodged. I suppose it was at the rate of one and a half or two tons to the acre, and between the places it was not more than at the rate of 500 pounds to the acre. In some places it run down the side hill in little brooks, and the next year you could see exactly where the track was. I have been trying to save this liquid manure. I use about 25 cords of sawdust per year. I have my tie-up so that there is a gutter behind the cattle. I put the sawdust in this, and under the cattle. I don't think I use more than half as much sawdust as I ought to; I think it soaks up and saves a good deal of the urine, and I see no ill effects from it in the manure.

Mr. GILBERT. One fact has been established here, and if we succeed in bringing out no other, the expense of these meetings will be fully repaid in the establishment of this one. The paper has shown us that the nitrogen and potash in the excrement of a cow for one year, *computed at the price which the farmers of Maine are paying to the dealers in commercial fertilizers*, is worth over $53.00. Three-fourths of this, or $39.75, is absolutely wasted. Now, supposing the farmers of this State keep on the average the equivalent of ten cows, and you have an absolute waste of $397.50, and in this is not included the value of the phosphoric acid in that manure. Is it any wonder that you have felt compelled to go to the manufacturers of commercial fertilizers to supply the place of this waste? Carry these figures home, put them on paper where you can look at them, and let them be a spur to increase your exertions to stop this enormous waste.

Mr. LELAND. I would like to call the attention of the Convention to one point: that is, that the liquid portion of manure is immediately available as plant food, whereas the solid portion has to be subjected to chemical action before it is available. Then if means can be devised by which it can be saved and applied directly to the soil, there is no further danger of loss, for the soil will retain all the elements of manure until the plant is ready to appropriate them. It seems to me that the method spoken of by the gentleman, of taking it directly to the fields in a hogshead is a very simple one, and it might be cheaper than it would be to haul large quantities of material to absorb it. If the liquid manure which we get from the wash tub and sink spout can be taken to the garden and applied directly to the soil, where it can be taken up by the growing plants, it is probably better saved than it could be in any other way. But to save it in liquid form requires constant care, and farmers are apt to be negligent. I think that calling attention to the magnitude of this loss must do good. One thing we must admit: that large areas are now barren, so exhausted of the elements of fertility that they barely pay the expense of cultivation. The question comes home to us, How shall we restore these elements of fertility? Can we do it as we are attempting to, by buying manures at great expense and letting our home resources go to waste? I believe that this loss of liquid manure exceeds all the other losses in our farm management. We must take means to save it. Some will do it in one way, and some in another. The question to take home to ourselves is, How can we do it best? I think there can be no doubt that the best place to save it is in the barn cellar, directly under where it is voided. Now, when we speak of barn cellars, farmers at once think of the cost. It is true that a cellar may be made that is so expensive as to be beyond the reach of many farmers of moderate means. But there are many barns which can be raised up, have stone put under the corners, cedar posts put under the body of the building, and thus a manure cellar can be made at a cheap cost, where the liquid manure can be saved by absorbents or by any other system the farmers may see fit to adopt. We must first feel the need of this saving, then we shall find means to provide for it.

Mr. Brooks of Alfred. I heard once of, I think it was a community of Shakers, who built a barn with a cemented cellar, so arranged that they could save the urine, and also with a chance to let in water upon the solid part of the manure and convert it into liquid; and it was all put on the land with a sprinkler, and the result was amazing, greater than any one would have suspected. I have always remembered this, and have endeavored to save all the solid and all the liquid manure about my premises. I have a cellar, and use a good deal of absorbents. I save the droppings of the cattle about my buildings; save it as I would so much money. You have all noticed, that cattle when turned out will drop manure as soon as they begin to move, and unless these droppings are taken where sun and rain will not affect them they won't amount to anything, the sun will dry them up and the rain will wash them away. I think the manure that is saved will more than pay for the labor of saving it.

Mr. VARNEY. I have a neighbor who has been for several years past making use of the scouring water or waste water from the woolen factories at our place. There is a good deal of dirt and sheep manure in it. He made an arrangement to have it run into a vault in which there was a pump. He has a very simple arrangement by which he takes it on to his farm summer and winter. He has a tank, which when full is a fair load for two horses, and simply puts on the spout, pumps it full and hauls it off. There is a series of holes at the bottom of the tank, and these are covered with a sliding piece which is also perforated with holes. A movement of this piece brings the holes in it over those in the bottom and allows the water to run out. I have asked him whether he thinks it pays, and the only answer I get is "I think I sha'nt abandon it at present." He told me that he drove across a strip in the winter when the snow was a foot deep, and the next summer he could see that strip just as plainly on the grass as he could in the winter on the snow.

I have a tank about four feet deep and ten feet across, set in the ground, where the water from my sink house is deposited from day to day. When it is full my man removes it. For my foreign grapes I have used nothing for years but the water from that tank, and I should not know how to get along without it.

Mr. STARRETT of Warren. The remarks of Mr. Varney suggest another source where there may be a considerable loss of a fertilizing element, viz. in allowing the water which has been used to wash wool to go to waste. There is quite a large woolen factory in my town, and I have never heard of this waste water from it being saved and applied. It is a well known fact, that in what is termed the yolk in wool, there is quite a large amount of potash, and also that this yolk is separated from the wool in process of washing, and is left in the water, which accounts in part for its effects as a fertilizer.

JAMES H. PENDER, of the United Society, Alfred. We have cellars under most of our barns, and always have absorbents put in to keep the urine. It is only of late that we have had barn cellars, and we find that we receive some three times the benefit that we did when the manure was thrown out. We used sawdust for an absorbent for a number of years, and came to the conclusion that it was a damage to our farms, hence we have not used it for some time.

WILLIAM EMERY, ESQ., of Alfred. It is very well known that there is a class of individuals living near villages and larger cities, who, keeping no stock are obliged to resort to fertilizers for their plants and gardens; but I believe that if they should take care of all the liquids about the house, and make a wise use of them, they would find them worth more than all the fertilizers they buy.

I have had some little experience within the last three years in saving the liquids from my house. I have a large cistern that holds from 12 to 20 hogsheads, which is connected by pipes with the set washtubs in my house, with the sinks, and with the bath tubs; and in it we save all the waste water from the house. I have a force pump in the cistern, so that I can take the water whenever I wish to, and force it to the different parts of my garden. The soil of this village is sandy and porus, and needs a good deal of water, and at times we suffer considerably from drought. For three years past I have used that water solely for garden purposes, about my house, where I have my grape vines, pear trees, flower and vegetable garden, and have used nothing else of any account. I am satisfied that I get more benefit from that water every year than I could from the fertilizers I could purchase for twenty dollars. I hazard the assertion, that there is no flower garden, vegetable garden, pear trees, or grape vines, that surpass mine, here or anywhere. Grape vines, according to my experience, require a great deal of liquid, and this which we save is just what they want to make them grow and bear an abundance of fruit. Up to within three years, my vines never bore much of any fruit, but since I have used this liquid they have flourished and produced a large amount. I believe if every person would save these liquids, they would have enough to enrich a small garden, such a one as persons about our villages usually have.

In relation to the urine from stock, I have not had much experience, although I have always since I have kept a horse used some absorbent, either sawdust, sand or turf. There are always places about the premises, such as the corners of gardens, where turf is growing, which can be taken off and thrown behind your horses. This matter of saving the urine of horses and stock must, I think, commend itself to the good judgment of all persons. If care was used by all farmers to save it, we should not hear much about buying commercial fertilizers. How very often in looking at the yards where cattle are kept in the summer, you see a large pool of water. What do you see in that water? Isn't there enough to satisfy you that there is a good deal of richness that is passing off in it? These things should receive the attention of all farmers, and we all should be farmers; if we cannot be large farmers we should be small farmers. There is no man living in the country as we do here, but wants a house and garden, and when you find an individual that don't have them, you don't have much of a man.

Vice President HARRIS. There was an old barn on my farm when I came into possession of it, a half dozen years ago. I keep some thirty head of cattle. I did not wish to go to the expense of raising the barn up, so I excavated some four or five feet deep under the tie-up, and having muck at hand I carted that in and filled it up to the floor, put some posts under the sill and boarded it up all along. Instead of going to the expense of making gutters, I bored holes behind where my cattle stand, so that all the liquid voidings go through on to that muck. I should like to have every farmer see the effect of that muck, to which no manure had been added except the liquid voidings of this stock. It convinced me of the great value of liquid manures.

Mr. LELAND. That muck is all that saved our president from being classed with a very careless class of farmers, who bore holes behind their cattle. We frequently see manure thrown out in heaps and left without any protection whatever; and all the elements combine to wash and waste it. I verily believe one-half of it is wasted and gone; the farmer's own land may get part of it, or a neighbor's land, or some brook may get it. My own practice is to tie up my cows every night, and use my manure as fast as I can make it. I don't know whether others may approve of it or not.

Hon. JAMES O. ADAMS, Secretary of the Board of Agriculture of New Hampshire, in response to the call of the President, said: I have been greatly interested in this discussion, and the more so because it is a vital one to men who get their living from the soil. I am glad to see that the attention of the farmers of this State is called to it, and from the spirit shown I am sure some of them have been practising in the good way; and I am sure, too, that some of them will no longer be classed with the negligent farmers, but will take advantage of the lessons learned.

Quite a number of things have been spoken of that should not be allowed to be forgotten, and attention has been called to some of them several times. One very important matter thus alluded to is the value of the droppings of the domestic animals. It has been thought that the cows of your State and mine are a poor set of animals, that don't quite pay their board; but I think if we reckon in this extra yield of manure, which it is no fault of theirs that we do not take care of, we must give them a little more credit than we have been in the habit of doing. The cows of my State do not yield more than $40 worth of milk annually, and that don't pay their board. I doubt if yours do any better. But if we add to that the $50 worth of manure we might as well save, we find it makes quite a difference in the account.

I will only make allusion to some of the practices of more economical nations in regard to the saving of fertilizers, and especially liquid fertilizers. It is the habit of the French people to save all the urine from their boarding houses and hotels. It is said that in China one of the perquisites of the chamber-maid is that she shall have what she empties from the chamber vessels. It is said that the servants receive quite a little revenue from chamber, privy and sink.

It has already been said that seedsmen and florists keep their plants thrifty by feeding them with liquid manure in some shape. The question arises, whether we ought not to make an effort to save our liquids in a liquid state, and not have anything to do with absorbents at all. Probably this is the most economical way. There is a good deal of time and labor required to gather these absorbents and handle them over from time to time, and unless your farmers like to shovel manure better than I do, I think they would be glad to save some of that work. In my own city of Manchester, there are a good many gardeners who have made arrangements to get the liquid manure from the stables. Many of these stables are cemented. These gardeners make a point to get that manure as much for the sake of the liquids as anything else, and draw it out in tight carts and save it in the soil. There are many of them who take night soil and reduce it as near as possible to a liquid state, and draw it on their land. The result is, that they get bountiful harvests every time.

Another point which has been alluded to, is the saving of the washings of wool. Mr. Smith, the Superintendent of the

Manchester Print Works, who was also a good farmer, was in the habit of saving this to put on his crops, and established a reputation for it, so that another firm in Manchester commenced to use it, and it always succeeded in bringing crops. Its effects are not evanescent; when once applied to land it will bear well for years and years.

Here is a point in regard to the application of liquid manures. We apply them almost always to the top of the ground. Now, I believe in a top application. I don't mean that I believe altogether in top-dressing, but I believe that we can apply very near to the surface better than away down. We used to think we must put our manure down deep. I think if it is to be put down deep, or on top, it is better to put it on top; but perhaps it is best a little way down. Now, we apply liquid manure on the top and let it go down according to its nature. Some of it won't go down; you know some chemicals will not percolate through the soil. I do not think a very large portion of what farmers call strength passes off in the atmosphere. Generally, that which we smell is not worth much as a fertilizer; I think chemists will tell you that it is sulphuret of hydrogen to a large extent, and that it is not of much value; that a gas is formed which retains the ammonia which it was formerly thought passed off.

Alderman Mechi, of London, who has a farm a little way out of the city, has adopted the liquid system altogether. He not only saves his liquid manure, but reduces his solid manure to liquid by pressure, using a steam engine which also forces it upon the land. He prefers to apply all his manure in a liquid state, and does it with great success. His operations have attracted a good deal of attention. My friend, Colonel Walker, whom I expected to come here with me, spent some time with Alderman Mechi, and if he had come could have told you something about his system that would do some good.

A matter to which attention has not been called, is the use of the sewage of the large towns. You know what immense amounts of fertilizing material has gone to waste in the streams upon which the towns are located. In some foreign countries, the sewage of the cities has so defiled the streams that it has become a nuisance which people have been obliged to devise means to get rid of, and premiums have been offered for the best method of getting rid of it; and some splendid machines have been devised, until they came to work, when they did'nt do anything. Recently, they have adopted in the city of Edinburgh, the principle of collecting the sewage in a large receiver, and drawing it on the soil. Several firms have secured the control of this, and the statement has been made that one of them cut, what would when dry be twenty tons of hay to the acre. The statement seems incredible, and I confess I have not much faith in it.

One other thing, which perhaps you would hardly class under the head of liquid manure, is that of irrigation. If any of you had a little stream by which you could water the land when you saw fit, you would see a result, not only in consequence of the moisture, but in consequence of the nutriment furnished to the plants in the water. There is a farm in my own State which the owner some thirty years ago undertook to irrigate. He expended quite a sum of money in bringing water from a pond to a side hill in an exhausted field, and now, after it has borne hay for thirty years with no manure, it produces more than a ton to the acre, of excellent grass, so that the investment was a good one. There are a good many little streams trickling down from our mountains and hills that might be turned on the plains, and would serve a noble purpose in time of drought, and would bring with them a great amount of fertilizing material that now runs to waste. It is pretty evident that the Maker of the Universe made these streams for some purpose more than to gratify the eye and turn here and there a mill.

I may remark, that perhaps the reason why the manure of fowls is regarded as better than that of other animals, is because it contains the urine in a solid form.

Mr. Brooks. I thought I had been pretty careful of my manure, but I can see and feel that there has been a larger waste about my house than I thought of. I think I have received instruction, and feel fully determined to attend to this matter more closely than I have done.

Mr. Brackett. I have always been somewhat radical in regard to this matter of purchasing fertilizers. I have always been opposed to making these men who deal in fertilizers rich, as we have been doing. I believe it is unnecessary to go off our farms to obtain manures necessary to carry them on. Until you have used all your available means, until you have saved all the liquid waste that has been referred to, and all the other waste about the premises, (as for instance, in how many places the droppings of the hen roost lay over year after year)—I say until you have used all your available means, you cannot afford to buy special manures; and after you have raked and scraped all you can, even then you had better make your own fertilizers.

III. The Compost Heap.

By Z. A. Gilbert, East Turner.

The value of liquid manures was shown yesterday, in a very good light, and one which must have opened the eyes of such as had not previously given special attention to the matter. Since we understand its great value, the necessity of saving it presents itself forcibly to our minds. I say necessity, and I think all good farmers admit that it is a necessity. Only a few days ago I was talking with a practical farmer, one who is dependent entirely upon his farm for an income, and he made the remark, that it is absolutely necessary to save the liquid manure from stock and buildings in order to keep up the fertility of the farm. To use his own expression: "It will go back on you if you don't." He said the solid manure produced on a farm was not sufficient to keep it up to its present degree of productiveness. If this be so, then comes in the question, What method shall we adopt to save this liquid manure?

There are two methods which present themselves to the practical farmer. The first is, that of saving it in a liquid form and applying it in that state. This is the most natural method, and so far as it can be carried out it is perhaps a desirable one; but I think that the attempt to carry it out has not been completely successful. Some individuals have gone to considerable expense to provide fixtures for that purpose, and have met with only partial success. The main difficulties in the way of the adoption of this method are, first, the cost of the necessary fixtures; and second, the fact that there are serious difficulties in the way of applying it at all seasons of the year, as for instance, when the ground is occupied by the growing crops. It cannot, either, be conveniently preserved for any length of time in large quantities in its liquid form. It would be very desirable indeed if a method could be devised whereby all these difficulties could be obviated. I should be very glad if some of you can show me how I can do it on my own premises. I have thought of this matter much, for I realize that it is necessary and proper for us to economize in the expenditure of labor in this direction all that we can.

We come now to the other method; that of saving it by absorbents—the method generally adopted by farmers who try to save it at all, and the one which promises the best practical results. It is true, that in using absorbents we have a good deal of bulk to handle, and if we increase the bulk we have, we increase proportionally the labor of handling. But it is better to handle this bulk than to lose the liquid, far better. If we could avoid the handling of a large bulk, to save the small amount of fertilizing material contained in it, we should be happy to do so; but, unfortunately, we have this material in bulky forms. All understand that the plant food contained in liquid manure is but a small portion of the whole amount; and the same is true of solid manure. If we could devise some method of separating this small amount from the whole bulk, and of using it after it was separated, without risk of wasting, it would be desirable, but we are not able to do so. The ground, then, that I take at this time is, that the only method of saving manure which is practicable to the ordinary farmer, is by the use absorbents, or in other words, by composting.

Following this comes the question, Shall we decompose the solid manure before it is applied to the land? This is a matter on which there has been a great deal of discussion, and in regard to which people still differ in their views. We all know that in the decomposition of the solid manure there will be a great waste of plant food, unless some absorbent is combined with it to hold that which would otherwise escape. This process of combining absorbing material with the solid manure of course increases the bulk of the mass, and the expense of handling, as is the case with the liquids. Here, then, comes in a question of economy: Does the manure become enough more valuable to pay for this operation of composting? I am aware that it is the opinion of farmers, that no plant food is added to manure by this operation. We frequently hear it said: If you apply manure in a green state and cover it slightly with the soil, you have got all there is in that manure. This being conceded, since of course the time and labor involved in the operation of composting are saved by the adoption of this method, we should have to admit that it is the best practice; and I am certain that in my vicinity most farmers hold to that opinion.

I have to dissent emphatically from that opinion. I have been forced to the conclusion that the value of manure is greatly increased by the operation of decomposition, where it is conducted intelligently and wisely. I say I have been forced to that conclusion. When I was a boy, my father composted for the purpose of decomposition a considerable portion of his manure, by mixing it with absorbent material. Very naturally, I questioned the economy of the practice, for like most boys I did'nt wish to increase the amount of labor about the farm. But I found as I grew older, that the most satisfactory results always attended the application of this decomposed manure. The practice extended somewhat to other farmers, for you know these things are apt to be contagious. Though farmers are charged with being careless, many of them are pretty close observers, and especially are they observant of results. It was invariably the case, that the best results followed. I recollect one little circumstance connected with my own practice in this respect. I built a barn cellar some years ago, and composted my manure in it. A neighbor of mine, it seems, watched the operation, and thought I was a very foolish fellow to go to all that labor. He built a barn cellar, and did'nt compost, but applied his manure to the land in a raw condition. I watched the operation closely, to see whether his method or mine was the best. I did not see that very valuable results followed the application of the raw manure. At last he came to me one day and said: "Before I built a barn cellar I thought you were foolish to expend so much labor, and I would show you that I had a better way. I was'nt going to haul my farm into my cellar to manure it, and then haul it back again; I was going to apply the manure to the soil and compost it there. I tried it and made a good liberal application." According to the prevailing notion, he had got all that manure in the soil, but he did'nt get the crops; it remained in the soil. He studied on that. The next year he thought he would fix me—thought he had'nt mixed it sufficiently with the soil; so he took a strip of ground and applied a very liberal quantity of manure, thoroughly mixing it with the soil. He put an immense amount of labor on it, for the purpose of convincing me that my method was wrong, and he failed. He said, "I give it up, I can't do it on crude manure; your compost will beat me every time." That was convincing testimony, and I felt encouraged to go on in composting; and I am still in favor of it, notwithstanding the work it involves.

Now, I like to know the reason for things. If we put crude manure in the soil, with all its ingredients, why don't we get the full benefit of it? Some will say, "decomposed manure acts readily"—that in my case I could see the effects immediately, and was therefore "deceived." I was not deceived. I was convinced that I got not only present results, but results that followed a rotation through several years. I looked out for that point, and fully believe I was not deceived in that direction.

The question recurs, then, why do we not get the full benefit of that raw manure; and an answer to it encroaches somewhat on the domain of science. I am aware that a practical man like myself must tread lightly here. However, in handling manures I have to deal with the constituents of manures. You all know that nitrogen is an important element of plant food. But nitrogen cannot be used by plants at all until it is changed to ammonia or nitric acid. Fresh manure contains a considerable quantity of nitrogen, but very little ammonia. If, then, manure in this condition be applied to the soil, a small portion of the nitrogen only will be decomposed and assume the form of ammonia; the remainder will unite with the elements in the soil, in insoluble forms, where it may remain in the soil for years, perhaps forever, of no use to the farmer. For example, fresh horse manure contains not more than one pound of ammonia in fifteen tons of manure, yet in those fifteen tons there is nitrogen enough to furnish one hundred and forty pounds of ammonia. If, then, this manure be applied to the soil in a fresh state, there is a serious loss of its leading element of plant food. Nearly every soil contains large quantities of nitrogen in insoluble forms far in excess of the ammonia needed for crops. But so long as it remains inert, it is no better to the farmer than so much granite. To render this plant food soluble, and therefore available, the manure must be decomposed before application. And to prevent all waste while decomposition is going on, it must be composted. This is my position; I know I lay myself open to criticism, but I am after information. If I am wrong I want to know it. But there is one thing about it, it tallies with my experience, and with the experience of my neighbors.

If the system of saving the liquid manures by absorption is resorted to, it is easy to combine with it the operation of composting the solid. In fact, it is not practicable to save all the liquids from farm stock without handling in some way a portion of the solids; the two are so mixed that I know no practicable way of saving them entirely separated. The absorbing material does a triple work; as an absorbent of the liquid, a divisor of the solid, and thus allowing the admission of the air to perform the work of decomposition, and as a saving medium for the escaping gases.

The next question is, What material shall we use as an absorbent? I believe I am safe in saying, that the best material at hand in considerable quantities is muck. I am quite enthusiastic on the subject of muck. I have used large quantities of it, and always with satisfactory results. It is used extensively in my vicinity, and is carted considerable distances by those who believe in its use. When well dried, it will absorb a very large quantity of liquid, and it does not become heavy to handle. It is almost entirely vegetable substance. When taken from the bed a large amount of water is suspended in it, so that it is necessary to have it dried before it is used as an absorbent.

Another absorbent, always on hand, and enough of it, is soil. When dry it will absorb liquid very well. It is not so valuable an absorbent as muck, on account of its being heavy, neither does it absorb so much in a given bulk; nor does it contain in itself so valuable properties. This last, it is not necessary perhaps to speak of here, because I am speaking of it not as a manure but as an absorbent.

Sawdust is used much in various localities, but I question whether it is well to use it, when everybody has plenty of soil within reach. Sawdust makes a good bedding, is clean for stock to lie upon, and is easy to handle, but as a component part of the compost heap it is not desirable, to say the least; no one claims that there is any great value in it. I do not say it is injurious to the manure, I only say it is not desirable.

I have never gained much satisfaction in the attempt to use leaves as an absorbent. If you are short of straw for bedding, leaves can be used for that purpose. I heard an agricultural address the other day, in which the speaker expanded somewhat upon the value of leaves, and said that a man could go into the woods and scrape up fifty loads in a day. I never was able to do so much as that when I had the best chance; and when we consider that one load of muck contains as much absorbing material as fifty loads of leaves, (for you have a very small quantity of material when your leaves are decomposed and compacted as thoroughly as muck is), I think we cannot depend upon using them as our principal supply of absorbent material. They are useful in their place, but we should not give them more importance than their value will warrant.

Straw is a good absorbent so far as it goes, and a good manure after having been decomposed. It makes a good litter for stock, and should all be appropriated. So we might go on through the whole list of absorbents, but it is not necessary, you all know what they are, and they need not be enumerated.

Before I speak of my own practice, let me say that I do not like to recommend my own methods very highly. I have not so much confidence in them that I am certain they are the best. For this reason I am reluctant to speak of my course in this regard, and if anybody has a better one I want to known it. But whether my method be faulty or not, if there is anything about my farm that I feel I have a right to be proud of, it is the care which I exercise in saving the liquid manures in and around my buildings. I think I am safe in saying, that since the cold of last winter ceased, there has been no waste of liquid manure about my house or barn. It is very difficult to carry out any system which you may adopt in winter as well as you can in summer, as any one will say who has tried it.

My practice is different from that of most farmers, who make a business of composting manure, in one regard; most of them yard their hogs on the manure heap. They put in the absorbent material, or what is far more common, omit it altogether, and let the hogs run over it, and the consequence is it is trodden down so that no decomposition takes place. In order to decompose a heap of manure, it is necessary to leave it in such a condition that the air will permeate through the whole mass. The Professors can give you the scientific reasons for this; I won't try to.

If you throw out horse manure into your yard or under your shed, and let the cattle run over it and tread it down solid, it will remain in precisely that condition for all time for aught I know. Consequently, I allow nothing heavier than a hen to run over it. I know almost everybody says—put hogs on horse manure. I cannot agree with them, and I have tried both ways. Horse manure is the very richest barn manure we have, with the possible exception of sheep manure. I regard it as much richer than cattle voidings, and I obtain better results from its use. I drop several cart loads of muck into my cellar—my cellar does not freeze—and every two or three days I throw over my manure and mix muck with it, and let it lay till spring. In the spring I put men in and fork it over again. No manure I use gives me so much satisfaction under every condition, and wherever I apply it, as that horse manure.

I keep my hogs in the barn cellar, but not on the manure of the cattle. Give hogs plenty of absorbents which are not already a manure, and they will make manure of them. Don't give them something that is already manure, and especially do not give them anything that is already so valuable as your horse manure.

My cattle are stabled nights during the whole year. I use muck as an absorbent, and as I said, make it do the work of absorbing the liquids and decomposing the solids at one operation. The muck is also a powerful deodorizer, and keeps my premises sweet and clean, just as they ought to be kept. There is nothing of that strong odor that you will detect in a barn where nothing is used. Soil is good in that regard, but not as good as muck. This, or similar practice, goes through the whole round of the premises. The slops of the house are absorbed by material provided for that purpose. I have never thought it desirable to run the slops under the barn for the pigs to wallow in. I don't want my pigs to wallow in filth. I don't know a neater animal about the barn than the pig, nor one that enjoys a clean bed better. Consequently, I provide absorbing material to take up these slops, where it is exposed to the sun and air, and the water is evaporated from the surface or leached through the mass, leaving the plant food retained in the absorbents. It is not necessary to excavate; it can as well be done on the surface.

Prof. **Fernald.** While it may be well to have it exposed to sun and air, to evaporate the water, would'nt it be well to have an arrangement to cover it when it rained,. so that it should not take on more water?

Mr. **Gilbert.** The suggestion is a good one, and I think such an arrangement could be easily made. Now, you see I have no costly fixtures. Any farmer can practice these methods, only he must keep his eyes open, and ever be on the alert. It is so easy to neglect, so easy to let these little things go by, when those that seem to be larger demand our attention. But we must remember that the sum of the little things make up the larger ones, and when we give to these little things the attention that their importance demands, our farms will increase in fertility. Every farm in the State of Maine has within its limits material enough if properly appropriated, to increase its fertility. There is not the slightest question about it. All that is required is to save what would otherwise go to waste.

In closing, let me say again, that it would be very desirable to apply plant food in a concentrated form if we could do it. It would be very convenient if we could carry manure enough in the vest pocket to plant an acre of corn. But concentrated commercial fertilizers are very costly. These which I have talked about saving are right at hand, and cost nothing but the saving. You can save far more plant food for the same money, than you can buy. It is a matter of the greatest importance, and I wish it could be impressed on the minds of farmers, that attention must be given to these little items of the waste that is daily going on about our premises.

DISCUSSION.

Mr. LELAND. It is the farmer's work to produce crops. He produces them from the elements of plant growth that are stored in or that are supplied to the soil. The matter of first importance to the farmer then, is the supply of plant food; and especially so when he is called upon to raise his crops from a soil which has been drained of it. We as farmers want to address ourselves to the saving of this waste of plant food, that we may use it in restoring the lost fertility of the soil. Not only do we want to save what we have, but we want it in the best form. By combining different fertilizing substances we may get the most complete and potent manure, and thus may find it a matter of economy to combine them, rather than to use them separately. I think, too, that Mr. Gilbert has shown us that there are practical difficulties in the way of the use of liquid manure separately, on the farm. Again, manures differ in their chemical condition; some act too rapidly, others too slowly, and by judicious combination these faults may be corrected.

Muck has been spoken of, and where it is easily obtained is generally used in the compost heap. Leaf mould is used by some, and is considered most valuable. Bones should be collected, and ashes saved, and used. Waste from every source should be absorbed and used. Some will contribute to the heap one element of fertility, and some another. For example, if you put in bones they will contribute phosphoric acid; if ashes, potash; and the urine will contribute nitrogen, and your compost will be a very complete manure.

A few words about muck. It is considered to be a very valuable substance. One deposit may be valuable in itself as a fertilizer, another is simply valuable as an absorbent. But all muck is valuable for its absorbent properties. There is another point in regard to muck which is generally overlooked, and that is its value as an amendment to certain soils, and especially to those soils which are denominated leechy, in enabling them to retain moisture. For such soil it is exceedingly valuable. Another valuable property of muck is this: that it will absorb ammonia from the atmosphere, or will hold it when it is washed from the atmosphere by rain. We have heard that it will absorb ammonia when it is formed by the decomposition of manure. It seems to absorb it as readily as it does moisture. Let me say here, that while I am a great reader of scientific matters, I do not profess to know very much about them—and sometimes I think the scientific men don't know the whole themselves. Farmers are apt to be frightened when they hear that a scientific man is going to lecture. They are like the boy who, frightened by the solemn manner in which the minister asked him, "Who was it that made the world in six days and rested on the seventh?" answered, "I did, but I won't do it again." We ought to learn all we can from science, and if its conclusions are confirmed by practice and convince us that we have been doing wrong, we ought to resolve like the boy that we "won't do it again."

In regard to the results that may be obtained by composting, I give the experience of a dairy farmer. He prefers a retentive subsoil as an absorbent to muck, and provides it for this purpose. His stock are kept in the barn at all times when they are not in the pasture. They are in nights during the summer, and the voidings are thrown into the cellar and mixed with the subsoil. Early in the fall he hauls out the manure and applies it to his mowing fields, and has been able in a few years to bring up the yield of hay from one to two and a half tons to the acre. As I said, he prefers subsoil to muck; farmers can experiment and see which is best. Another farmer of my acquaintance, who always keeps a quantity of this absorbent material on hand, and whose fields are in marked contrast with those of his neighbors, puts it behind his cattle, whence it is passed with the manure to the hog pen, and the hogs are enticed to work it over thoroughly by throwing corn among it. After as much is put in as they will work over, it is removed and other material put in. He has made a quantity of manure this season, which, liberally applied in the field, has enabled him to raise over 300 bushels of Early Rose potatoes to the acre, while the average yield in that section was less than 100 bushels, showing what he saves as compared with the farmers who bore holes in the barn floor behind their cattle.

There is a great loss from the poultry yard. Fowls kept on the farm are allowed to roost in the fields, by the road side—and the shed where the farming tools are kept is a very general roosting place for them. I have a neighbor who had nearly given up raising corn; he thought he could get his corn easier by raising and selling potatoes. He attended the meeting at Newport, and was convinced of his error. He saves his manure much as Mr. Gilbert does. He spread this on the surface, worked it well in, and applied a pound of composted hen manure to the hill. I have here a statement which was printed in the local paper, and which brought out a good many others, but nobody had a piece that equalled this for rapidity of growth. The statement closes by saying: "I would rather have a barrel of hen manure than a barrel of the best commercial fertilizer that was ever brought into the county."

Mr. Reynolds. I have composted considerable manure for the last three years. I tie my cows up at night, and have a trench back of the cattle, which I fill with loam. In the morning I clean it out and it all goes down together. I have generally made from forty to fifty loads; this summer I have made much more. The use of absorbents does not fine it up thoroughly, and this year I let the hogs do it. I have eight shoats; the pen is 14 feet wide and 38 feet long. I have it filled up to the depth of four feet, making 2,128 solid feet of manure. I have a stable where I usually keep two horses; the urine runs down into the cellar, where I keep an old hog in one part and two early shoats in the other; and there I have made about thirty loads, or about one hundred loads in all during the summer. I have kept ten cows, and a part of the time a pair of steers, which I tied up until the very warm weather.

Considerable composting is done in my neighborhood. A short distance from me is a farm of about 1,200 acres, owned by Mr. Warren Ward of New York, which he has named the "Herdsdale Farm." He has a barn 170 feet long, with a cellar under the most of it. He keeps twenty-seven cows, and under the tie-up he has a pen 10 feet wide and 75 feet long, where he keeps seven hogs. He has about 3,000 solid feet of manure in that pen. He has also a stable 30 by 40, where he keeps a lot of horses, generally from four to six, all summer, with hogs underneath. He has carted in a large lot of muck and stuff from the road side, and has about as much manure there as under his barn. He has also a building that is used for a hog-pen, that runs 80 feet from the stable, with basement underneath all parted off for hogs. He keeps about fifty hogs, and intends another year to keep one hundred. Another year he is going to build a barn with a cellar under the whole of it, so as to keep more hogs, and when he has that done I think he will be able to "go the whole hog."

Mr. NEALLEY of South Berwick. Muck beds are not so accessible with us as they are in some other portions of the State. We use clay quite largely in the compost heap, and with very good success. I know it would not seem at first sight that clay is an absorbent, but it will absorb very much when dry. My own farm is not large, but it is very productive. I use clay with the soil that is on top of it, in composting. I have used muck, but I find it is a long time in getting dry, and does not absorb the liquid as well as clay. I know clay is a hard substance, and it is not easy to handle it over, but hogs will do it. I use my material in precisely the same way as was stated by Mr. Reynolds. I keep three cows, two horses, and sometimes as many as a half dozen hogs. I always put my stock in the barn at night. I keep a good many hens and save all the manure.

Elder **Otis Sawyer** of the Alfred Shakers. I wish to say a few words corroborating what has been said in regard to the value of muck. In the winter of 1852, when in charge of the Shaker farm in New Gloucester, I hauled out 100 loads of muck from what I considered a valuable bed, which I had discovered the season before, and put it near our buildings. The brethren had experimented with muck some years before with unfavorable results, and objected very strongly to my hauling this out; one aged brother who had helped haul the other lot, being very certain that there was no value in it. The next spring, in planting our corn we failed to have enough manure to put in the hill, and for experiment I hauled into the field three or four loads of that muck, which had then lain three or four months and received the action of the frost. I put a shovelful in a hill, and then went over the piece with ashes, and put a handful of ashes in each hill on the muck, covered it with a little dirt, and planted the corn. The old gentleman still had no faith in it, but he helped cover it, and marked it to see where it was. In August I invited him to go out and see it. "Why," said he, "it is charming good corn; I don't see but 'tis just as good as that which was planted on the best manure." It was extraordinarily good muck—vegetable material decomposed. The muck that was left we shovelled over, mixing with it four or five casks of lime, slaked with water; and I think I put some refuse from the barn or cellar with it, and shovelled it over, mixing it well through, and put it on the garden; and wherever we put it we considered it as good as an equal quantity of manure from the barn. So I have great faith in the use of muck, and we use it in composting, every year. We put it under the stables and privies, and find great advantages from the use of it. We keep our hogs under the stable where we keep our horses, and on the manure. We have muck there and sawdust, and think the latter a good absorbent when we cannot get muck. The hogs work the horse manure and muck together, and when we haul it out we find it very strong in ammonia, and consider it the best manure we have on the farm.

Vice President **Harris**. The remark that this muck was of excellent quality, suggests to me a warning against calling every deposit of black swamp mud, muck.

Prof. **Carmichael**, in answer to an inquiry in regard to the composition of muck, said:

I must return the thrust of my friend here, Mr. Leland, by calling attention to an infirmity which has a great deal to do with these questions. I recollect of a learned professor who asked a student, who he was desirous should pass an examination, the color of the mineral beryl. "'Red," answered the student. "Red—yes, brownish red, greenish red, yes, green—correct answer." This illustrates a characteristic of the race. If we want a thing to take place, we can prove that it will take place; if we want a thing to be so, any assertion that it is not so will not change our opinion.

Muck is decayed vegetable fibre, and as has been said, it is marvelously retentive. It may take up potash or some other substance, and the manurial properties it furnishes must be largely in the substances thus taken up; though to certain soils it may be beneficial in improving the texture.

I wish to call the attention of the Board to some remarkable experiments made by Prof. Voelcker, which have demonstrated that earth will burn up the ammonia in human fœces just as charcoal would; and that earth which has been used in earth closets is almost worthless for agricultural purposes. Ammonia is the most valuable constituent of manure, worth twenty-one cents per pound, while phosphoric acid is worth but six cents. I think the suggestion of using clay rather than earth, is a valuable one.

Mr. **Farrington**. I wish to put a question to Mr. Gilbert. He says that if horse manure be applied in a green state, the nitrogen which is in it does not change into ammonia, and that 139 parts in 140 of this element will be lost; whereas, if it be composted the nitrogen becomes soluble, and is appropriated by the plants. Now, my question is this:—What difference does it make whether the manure containing this element in an insoluble state, be composted with a cart load of muck, earth, or sawdust, in the barn cellar, or in the vicinity of the barn, or be hauled into the field and mixed with the earth—composted with a larger amount of earth?

Mr. GILBERT. I don't pretend that I can answer all questions that may be asked, but fortunately for me, I believe my answer has been anticipated by Prof. Carmichael. He has just told us, and it hits my case precisely, that when human voidings are combined with soil, the nitrogen is lost to use, or, as he expresses it, burned up by the soil. Now, the ground I took was precisely that—that in mixing the green manure with the soil, the nitrogen which should have been changed into ammonia combines with other elements, becomes insoluble, and is lost to the farmer.

President ALLEN. I only wish to say, what I think Prof. Carmichael would say, had he not been called away, that there is a distinction to be made between the humus, or soil, and dried muck, or the subsoil clay which he thought would make a good absorbent. All these elements seem to be adapted by Providence to the office of getting rid of the noxious constituents of offensive matter, and the muck or clay not only performs the office of a deodorizer, but the special office of an absorbent in retaining the ammonia.

Mr. FARRINGTON. My question has not been answered. Mr. Gilbert recommended both muck and soil as absorbents, giving the preference to muck, as being more easily obtainable, a better absorbent, and possessing greater manurial value in itself. My question related to the comparative effect of the same substance, soil, used in different proportions in the field and in the compost heap.

Gen. BROWN. I think that Prof. Carmichael's mention of the Voelcker experiments, in relation to the value of earth which had been used in earth closets, grew out of a conversation which I had with him in regard to the subject. As you are aware, there are difficulties in the way of the use of water closets in the country, where sanitary arrangements are not easily effected; and it is pretty well known that quite an excitement has been made about the deodorizing properties of earth. It was regarded as a great discovery, that in a very short time the excrement would become entirely inoffensive, so that it could be readily handled; and as there was no chance for the constituents to escape, it was believed that its manurial properties were entirely retained by the earth. Living in the country myself, I have used one of these closets, making use of finely sifted coal ashes as a deodorizer. I am satisfied from my experience with the use of this material from the closet on the land, that a chemical process goes on which destroys the nitrogen; and the result of these experiments, as stated here by the Professor, shows that the same is true where earth is used. Therefore, I think it is a mistake to use earth in composting. Clay would undoubtedly be much more satisfactory. I believe the best place for the earth is in the field. If we want to get manure and earth together we will find it best to haul the manure into the field and mix them there.

Vice President HARRIS. I would like to know where Mr. Gilbert gets his authority for calling horse manure better than that made from neat stock. My own impression about it is, that the value of manure depends very much upon what it is made of. I don't care very much what is the machine that makes it, provided you have used the right material.

I wish to say one word in regard to the application of manure. We are trying to get at the most feasible way of saving manure, so as to give the land the benefit of it. Of course we want to curtail expenses as much as possible, and the labor account of the farmer is a very serious matter of expense. I take it for granted, that few farmers get along without hired labor. My own practice, and I believe I shall follow it till I am convinced that there is a better, is to haul my manure whenever I have it, and have a place to put it. I don't care what month in the year it is, nor what day in the month, if it isn't Sunday. If I have land plowed that I want to put manure on, my manure is going there as fast as I can make it.

Prof. **Fernald.** If manure is drawn directly to the field, I think it should be hauled there somewhat earlier than it would need to be if taken from the compost heap, so that there may be some time for decomposition to take place.

In regard to the earth closet, I think the best material that can be used there is clay in a fine state. In most places it can be obtained finely pulverized in the scrapings of the road, and it will retain the fertilizing properties of the excrement. I have used it for several years, and used the material as a fertilizer in my garden, and found it very effective. This year, for the purposes of experiment I made an exchange, and used it on grass land, and applied barn manure to my garden; but for several years this is the only manure I have used on it. The clay should be very finely divided.

Mr. **Gilbert.** In answer to the question of the President, I would say that the analysis given by Mr. Flint in his paper, makes horse manure richer than cattle manure. Another authority which has weight with me, is the testimony of my fields.

Vice President **Harris.** Mr. Ayer says it is safe to buy shorts to feed to stock, and figures out the value of the manure in consequence. What is the sense of doing that if you have a fixed value for each kind of manure?

Mr. **Gilbert.** Of course manures vary with the feed, but the results given is the average of a number of analyses.

Mr. **Harris.** Can you raise better corn on your horse manure than on hog manure?

Mr. **Gilbert.** I do every time. We should not lose sight, as some remarks which have been made might have a tendency to lead us to do, that it is value and not bulk which we are after in composting. We want to get the most plant food in the smallest possible bulk. So, when a man says he has so many loads of compost, it does not prove that he has more value than another man who has a less number of loads. It should ever be our study in making compost to concentrate it. You will find that you can sometimes make this material do a good deal of duty, and its value will be increased in proportion.

IV. Muscle Beds.

By Samuel Wasson, East Surry.

Those marine deposits, known as "muscle beds," occur at numerous intervals in the coves and inlets along the sinuous coast line of Maine. Wherever the waters of fresh streams are discharged into these coves, bays or inlets, and at the point of equal resistance between salt water and fresh water currents, are the locales favoring their formation. Here the sediment, mud, slime and ooze, brought into the salt water by the influx of fresh streams, are met by marine mud and mosses, seaweed and sea-grasses, jelly-like radiata, by non-decillions, and blue-shelled muscles, clams, cockles, and snails innumerable for multitude, accumulate in the inflowing tide, making a final deposition, which becomes the residences of generations of muscles.

These deposits are charged with organic forms, and impregnated with various chemical salts, such as carbonate of lime, sulphate of soda, sulphate of magnesia, chloride of sodium, (common salt), which enter the structure, and are essential to the life of innumerable animal and vegetable forms, dwelling in the sea, and dwellers in muscle beds. These repositories furnish suitable habitats for all the molluscous animals, especially for the bivalvular shell-fish (of the genus *mytilus*), known as "muscle." Here they congregate and multiply in great abundance, finding homes, food, and graves.

The muscle, unlike any other species of shell-fish, is provided with a byssus; a long, delicate and silky fasciculus of filaments or hairs, by means of which it fastens itself to some substance, or to its neighbor, giving a colony of them the appearance of a web of shell fish. These deposits, or muscle bed plateaus, usually are in some sea basin, so that only after the accumulations of bygone ages, are they elevated above the surrounding surface. The best muscle mud lays at extreme low water mark, and cannot be got only at the high run of tides, at the new and full moon. Muscle beds vary in size, from half an acre to ten acres, and in depth, from one to ten feet. There are two ways of getting it—by gondolas or scows in the summer, and on the ice in winter. Common sized gondolas will carry from four to six cords. Three men will load and unload them at a tide. The mud should be delivered at landings or wharves, at a dollar and a half per cord, and drawn to the field at the rate of two dollars per cord, per mile. A much cheaper way of procuring it, is to haul it in the winter. Unless the ice is very thick, a man will cut the holes and shovel out two cords at a tide, at a cost of fifty cents a cord. Unless the bank is steep, a single horse will draw on the ice to the shore, and directly to the field, a cord at five turns, or at a saving of 50 per cent. over summer getting. Its weight, six tons to the cord, and bulk, are such as to forbid its profitable transportation to a long distance into the interior; but within a moderate distance of the deposits, its value as plant food warrants an extended use.

It pays best, to use it as a top-dressing for grass and grain, and to this end, when drawn to a field it should be dropped, a shovel full in a place, three feet apart each way, or equal to ten cords per acre. Thus dropped, it is exposed to the air and frost, for it must be frozen, before it can be spread, and unless it is well frozen it is of no value. Unlike similar marine deposits on the coast of France, known as "tangues," it requires a freezing air to break up its cohesive character. By freezing, muscle mud undergoes a process of disintegration, or rather of slacking, like lime or marl. When freezing it swells, and when thawing it slacks and falls into a fine powder, and can be spread like ashes. The greatest benefit is derived from it on moist, clayey loams, and next on sandy loams which do not parch with drought. If applied to grain or hoed crops, it should not be worked deeper than with the harrow. If plowed in, there should be two plowings, for the nearer it is kept to the surface the better.

Practice has shown that more than ten cords per acre, per year, is injurious rather than beneficial. An application of ten cords per acre will produce from one and a half to two and a half tons of hay per acre, for several years, provided the seasons are favorable. Fields that are dressed heavily with muscle bed, suffer great diminution of crops in dry seasons; but there is this offset, the muscle mud does not go to waste like manure, but remains inert until wet weather, when it becomes active. When too large quantities are applied the land is apt to fall heavy, bake and crack, and to be restored to good condition, must be dressed with seaweed, muck, or manure.

Of the durability of muscle bed, especially on heavy clay lands, the instances are many, of fields which after one good coating have continued to produce a good crop of hay for more than twenty years. For a garden, especially for turnips, beets and carrots, it seems to supply the elements necessary to produce a good crop. It is said to be an excellent fertilizer for onions.

Muscle bed, is well said to be a very complex body. It varies in quality. The best is that which contains the most muscle shells, and the least coarse sand. As it has but rarely come under the inspection of an agricultural chemist, but little is known of its composition. A single analysis which has come under our eye, gives its average composition to be:

Organic matter, - - - -	2	per cent.
Soluble salts, - - - -	1	"
Carbonate of lime, - - - -	33	"
Clay, sand and silicates, - - -	63	"

Its value as a fertilizer is determined chiefly by two causes: as a supplier of plant food, and as a mechanical agent. The elements of plant nutrition which it affords, and which have a definite value, are ammonia, potash, soda, lime, magnesia, and phosphoric acid, each an essential constituent of plants.

As muscle bed supplies all the essential constituents, it should be classified as a complete, rather than as a partial fertilizer. It is also a lasting one, and one of the few lasting manures obtainable in a cheap form.

Carbonate of lime, which represents 33 per cent. of the plant-feeding composition of muscle bed, is the prevailing component in the shells of the invertebrate animals, such as muscles, clams, lobsters, oysters, &c. It is known that lime, in all cases, forms a considerable proportion of the weight of the ash of plants. According to Professor Johnston, the crops of one acre during a four years' rotation, contain on an average 430 pounds of carbonate of lime, in a state of marl, shell, sand, or limestone gravel. Without doubt it is the shell-lime which makes muscle bed show its effect so signally when applied to clay or loam, for it decomposes the clay and frees its alkali, thus enhancing the effect of tillage.

In estimating the value of manuring agents, most non-professional, or purely practical farmers, fail to consider their mechanical agency and influence. True, science has no standard for measuring the mechanical value of a fertilizer; neither has it for the mechanical operations of tillage, or why a field well tilled yields a richer crop than one badly tilled; yet, it is well known to both science and practice, that the operations of tillage and of manure are supplementary to one another, and also that a manure which acts partly as a mechanical agent exerts as favorable an influence as one which supplies only the direct elements of plant food.

The efficacy of dock or flats mud, which, when applied to certain fields will so largely increase the amount of their future hay crop, is due mainly to its action as a mechanical agent; for, flats mud is little else than silicates and comminuted shells, or carbonate of lime, which science asserts "has no commercial value as a fertilizing substance," while the experience of those who have used it give it a high value, perplexing or paradoxical as the statement may appear.

Says Prof. Dana, "he who sows muscle bed, sows carbonate of soda, which has the same effect as ashes, only in a more decided manner. The real fertilizing value of muscle bed, when it is rightly applied, is much greater than its analysis would seem to warrant."

We cannot account, in the present state of chemical science, for all the effects which we see, and which we know are produced upon grass fields by the action of muscle bed; nor will we attempt to propound any theory, while our chemical facts are as imperfectly ascertained as is now the case. In practical agriculture, we know that it is a first-class fertilizer for grass lands, although the agencies in operation are as entirely beyond our control as they are beyond our ken. Nor do we offer any theory to explain why it will produce such a remarkable growth of herds-grass (*phleum pratense*), red-top (*A. vulgaris*), June-grass (*Poa pratensis*), and Meadow-foxtail (*A. pratensis*). Often a single application will double or treble a growth of these grasses, and such of their allies as seem to require an extra feed of lime.

It may be said that this talk of doubling the grass crop, is a "castle in Spain," or well enough to "point a moral," but we can name many a farm in Trenton, Lamoine, Franklin, Cranberry Isles, Surry and Brooksville, where it has practically been accomplished. That far too many of our coastwise farmers have no practical knowledge of the value of this marine manure, our hungry, half-ton-per-acre, impoverished and barren sea-shore fields attest. In the simple sentence, "the grass faileth," is expressed the very extremity of farm desolation, a "desolation" for which there is no excuse for one living within a six mile range of a muscle bed deposit.

In the long list of manures, natural and artificial, we can name no one which at the same cost, will produce such a quantity of hay upon a given surface, as muscle bed; and he who applies it to his grass fields in liberal measure, need not, in calculating the crop, leave a wide margin for hard seasons and bad luck.

In some parts of the world the muscle is prized as an article of food; with us they are considered of no value; indeed, most of our along-shore people suppose it to be poisonous. To some stomachs the muscle is injurious, and the same is true of two other species of bivalves, found and in much esteem on our coast, the clam (*Mya arenaria*), and the quahaug (*Venus mercenaria*). On the coasts of Scotland and France, muscles are gathered by cargoes, by dredging, to supply bait for the cod fishermen. In some of the bays in France, muscle culture is a profitable business. The mode of culture is similar to oyster culture. A year is required for them to grow to a marketable size. The muscle, like the clam, is self-generative. In bays devoted to the breeding of muscles, no copper bottomed vessels are allowed to enter, as the copper impregnates the breeding hurdles with poisonous properties.

I am requested to answer, "Whether the right to take muscle bed, or seaweed, is a public and common right, or whether a riparian owner can maintain an exclusive privilege to any part of it, or to the whole?" It is very remarkable that the statutes of Maine, with its thousand pages of nicely prepared enactments, is silent in regard to the ownership of the tens of thousands of acres within the flux and reflux of the tide. Hence the ownership of land between the lines of high water and low water, over which the tide ebbs and flows, must be determined at common law, or the law of usage.

The Colonial Ordinance of 1641 provided that the proprietor of land adjoining on the sea or salt water should hold to low water, *where the tide does not ebb more than* 100 *rods*. That ordinance, however, did not present a rule for apportioning flats to the owners of adjoining uplands; nor have the decided cases entirely agreed in furnishing a rule for that purpose. The principle of law is, that a deed of land adjoining the sea carries with it adjoining flats, with muscle bed or seaweed as appurtenants thereto.

DISCUSSION.

Gen. J. MARSHALL BROWN. All persons who reside within ten or twelve miles from Portland, on the bay, are familiar with the term muscle mud. I presume there is not a farmer residing within a reasonable distance from the shore who has not either used it on his own farm or witnessed its effects. We have barnyard manure spoken of as a perfect manure. In our section we consider muscle mud a perfect manure for grass—that is, a field will never require anything but muscle mud to keep the grass good; and I am informed by my friend, Prof. Carmichael, that it contains all the constituents of a perfect manure.

I presume no one has ever been on the bay at low water without seeing innumerable small shells. These are the signs of a muscle bed, which consists of decayed and decaying muscles, and the ooze and slime accumulated in the formation of the bed. Muscles can only live, I am told, in mud which is covered part of the time with water. Muscle beds are formed as oyster beds are, and the superincumbent mass gradually destroys by pressure those underneath, until there is a mass ten or fifteen feet deep, composed of decayed animal matter, and shell-fish, together with the deposit which the tide leaves at low water, which gradually becomes a portion of the mass.

The use of shell fish for manure is probably as old as their use for anything. The early discoverers found the Indians using shell fish as well as ordinary fish for that purpose. It has been used in my neighborhood for a long time. My own farm is one of the oldest in the State, having been cultivated since 1632, and there has been no time when the use of muscle mud was not known. I have been informed, that thirty years ago its use was more general than now; that no man ever attempted to carry on a sea-side farm without muscle mud. Shells are found throughout the mass in a more or less disintegrated state, but are not probably of great value, as I am informed that our land does not particularly need lime; the great value is in the decayed animal substance.

In my neighborhood the farmers improve the interval between harvesting and winter, to get out large quantities of it. It is secured in scows, so constructed with bulkheads that they will float when very heavily loaded; for the mud as it comes from the bed is very heavy. The scow is floated to the bed at high water; at low water the mud is shovelled aboard, and at the next tide the scow is floated ashore and unloaded. Twenty-five years ago there were half a dozen wharves on Presumpscot river given up to the landing of this mud, and from them it was sold to the farmers. The largest quantity which has been got out for many years, was got out last winter on the ice. The facilities for getting it out are better in winter than in summer. When the ice will bear the teams, holes are cut in it over the bed, the mud is then thrown out on it and hauled off. Sometimes the farmers will have two or three sleds, and relays of horses, so that the teams are continually passing to and from the shore, where it is loaded, and whence it is hauled at the pleasure of the owner. It is quite an extraordinary sight for one not accustomed to it, to see twenty-five, thirty, or perhaps forty teams together. The mud cannot be spread until it has been disintegrated by the action of the frost. After this disintegration takes place, it has much the appearance of ashes. It is fine, with half crumbled muscle shells scattered all through it. The accumulation is all the time going on. It is probable that there is more of it now on Casco Bay than there was twenty-five years ago; so that it is a bank on which one can draw without the possibility of having his drafts dishonored.

I have made some inquiries of my neighbors as to its value as a dressing. My first informant told me that a neighbor of his, living seven miles from the seashore, preferred to pay two dollars per cord for muscle mud delivered at the freight station of the Maine Central Road, where it was put on the cars, transported seven miles, and then carted to the field—he preferred to do that rather than to pay the same price for stable manure in town. That shows the estimate which a careful, successful farmer places upon it.

A reliable gentleman informed me, that twenty-five years ago he deposited a large quantity of muscle mud on a grass field. It was deposited in heaps in the fall of the year, or probably after the first snow came, when he could go over the field without injuring it, and spread in the spring. This gentleman states that now, at the expiration of twenty-five years, one can see in the field the spots where the muscle mud was thrown.

I will give my own experience in using it. Four years ago I had a worthless bit of land from which all the grass had long since departed, and which was covered with all sorts of weeds not worth cutting. I dressed quite a large strip of it pretty freely with muscle mud, hauling it on in the winter, and spreading it in the spring. That very year there was a marked improvement in this patch of land. Any one could compare it with the other portion, which for experiment I left without dressing. It continues to produce a good crop of grass, and there has never been anything put on it but muscle mud, no seed.

On the farm adjoining mine, which two years ago I had under my charge, I made a contract for the delivery of 100 cords of muscle mud upon a field of ten acres, for which I think I paid $2.25 per cord. It was delivered in the fall of the year, hauled from a gondola, the field immediately adjoining the landing. It would of course cost considerable more delivered in the country, according to the distance it must be transported. In the spring it was spread over the field as well as it could be without brush harrowing it, which I should have done had I had the facilities. The field produced such a crop of clover without any seeding, that the next year it was difficult to walk through it. These are the only experiments made by myself. I cannot tell where the clover comes from, but it is the testimony of every person who, uses it, that it brings in at once a growth of clover without the sowing of any seed.

Of course, the evaporation of the water will reduce the weight of muscle mud. If a person living in the country had a place near the landing where he could haul it, and let it be disintegrated, the weight to be transported would be much less. Farmers in my vicinity, however, take it just as it comes from the bed.

Messrs. MALLETT and WINSLOW made statements as to the use of muscle manure in their respective counties, giving such information as they had gained from those using it. The former spoke of a statement made with some excellent wheat exhibited at the Sagadahoc Fair, in which a yield of forty-seven bushels was obtained from one acre and forty-seven rods of land, dressed with muscle mud alone, the acre being greensward, the remainder old ground. Mr. Winslow spoke of its effect upon grass fields, in bringing in grass without seeding; the farmers say they don't know where it comes from, but it comes.

THE EDUCATION OF FARMERS AND MECHANICS.

BY CHARLES F. ALLEN, D.D., PRESIDENT OF STATE COLLEGE.

The education of farmers and mechanics is a subject of great importance to every nation. While so many in every community are engaged in these industrial pursuits, the well being of this large proportion of the inhabitants demands the attention of the statesman and the philanthropist. To secure the greatest good of the greatest number is no unworthy aim of the most pure and exalted. Expansion of intellect gives a double power of enjoyment. In proportion as a human being is raised above the brutes in his reason, so are his enjoyments of superior value, more lasting, and of higher worth. Nor can the intellect receive full development without systematic instruction. To increase the sum of human happiness the intellect of the working man should be trained, and every facility of the most approved methods of education should be furnished.

Moral education is closely connected with intellectual advancement. Not that intelligence and morality are of necessity equally developed in all individuals, or in all communities, for some prostitute the noblest faculties to the service of vice. But the tendency of intellectual culture is to promote virtue; while vice and ignorance are natural allies. We cannot expect that free institutions in a Republic, which have taken root in intelligence and are nourished by a pure morality, will flourish when education is neglected by the great mass of the people. The laborer, without mental power that comes alone through a thorough education, is not prepared to meet the responsibilities of a citizen, nor to enjoy the prerogatives of a freeman. Education does not interfere with successful labor. So far from hindering the creation of value through industry, education renders the toil of the workman more productive. Nor is it enough to have workmen who are skilled in their several departments of labor. There is a difference between skilled labor and educated labor. Skill gives facility of performance—education, power of thought. Every one knows that by frequent repetition any act is more readily performed. Feats, which to the unaccustomed are impossible, or which would require much time and care, are easily performed by the expert. What appears to be a special endowment is only the natural result of the great law of habit, and requires no especial exercise of thought, invention, reflection or judgment, but merely practice. The trained eye to perceive and the trained hand to execute make skilled labor. The narrower the field of operation, the more intense the activity, and consequently the more successful the immediate result. Mechanical skill is largely induced by the division of labor. The most wonderful accuracy and celerity are attained by laborers in those manufactories where uninterrupted employment is given to each one in some minute part of the general work. To concentrate the whole of one's soul, intellect and body in one narrow round of activity, however intricate, will not make an educated laborer, though it will produce a skilled workman.

For the supply of skilled labor we are still largely indebted to the old world; where an over-crowded population, and the strong pressure of eager competition of ignorant, starving laborers, under a system of minute division of labor, compel those who would live to secure the highest attainments of skill. The emulation of the child to imitate his father's dexterity, the training of youthful muscles, the almost instinctive aptitude early manifested, and the life-long practice uninterruptedly pursued, make the skilled artizans imported at great cost to fill the places where most of manual dexterity is required in our large manufacturing establishments. The ignorant peasant of France may be the most skillful lace weaver; the Italian hand can best chisel out the elaborate designs of the sculptor; the Hindoo alone has the skill to weave cashmere shawls; and the Chinese to work trinkets in ivory. These are not educated laborers. The Yankee boy who has graduated from the old brown school-house does not fancy such a restricted use of his energies. Instead of a weary apprenticeship and a life-long bondage in monotonous toil, he prefers some employment that will task his intellect as well as his muscles. He chooses not to be only part of a machine that does fine work, so he prefers to make a machine that will do the work while he watches its operation. Instead of making himself merely mechanical, the educated laborer frees his soul from the conscious degradation which must always exist where there is a sense of mental inferiority to his employer. Cheerful service can be rendered where respect is shown, and respect can only be commanded by intelligence. A vigorous mind left uneducated rebels against the condition of inferiority and servitude; and if it cannot break the barriers of caste and rise in educated power, it too often drowns itself in dissipation and vicious indulgence;—or brooding over its condition, gives way to envious discontent;—and sometimes with passions inflamed by intemperance the debased laboror turns against his employer with brutal and vindictive violence. It only needs some slight provocation or some artful demagogue to induce strikes and mobs. Ignorant and degraded laborers are easily roused to make insane demands for wages higher than earnings; and to enforce their claims by methods still more insane. As if the destruction of capital would improve wages, or forcing the rich to withdraw their capital would benefit the laboring class.

From this dangerous class, tramps come forth to prey upon society; to beg or steal, to rob or murder, as fitting opportunity may serve,—skirmishers of the fearful army of disorganizers that war upon government and property. To protect the national life, to secure the peaceful possession of property, to prevent anarchy and ruin, we must have educated laborers or a despotic government; we must build and maintain schools and colleges, or jails and prisons.

The best remedy against the wide-spread and growing disaffection, jealousy and antagonism between labor and capital, is the system of co-operative labor, by which the laboror becomes himself a capitalist, and shares in the profits of the enterprise. But the ignorant laborer has no desire for such a position, as he never thinks it within the compass of his attainment. He is too narrow and unreasoning to start out of the beaten track of slavish toil. Without education the laboror, even if he desired it, could not profitably to others, or safely to himself, enter into a co-operation for which he is unfitted. The laborer must be intelligent, to desire some share of the capital which his industry requires; and he must have some training besides mere mechanical skill to organize a company of fellow laborers whose united earnings may furnish the money necessary for the prosecution of the business.

Nor will the capitalist be likely to receive an ignorant laboror as a co-partner, by which alliance the workman is to receive wages and also be a sharer of the profits. If there is suitable education, proprietors may possibly convert their manufacturing establishments into such joint stock companies, with shares so sub-divided, that each intelligent and enterprising workman might own one share and thus virtually become a partner in the concern, while the controlling power is still held by those who furnish the largest proportion of the capital; and thus the interests of the employer and the laborer become identical.

Or if boards of arbitration are to settle the question that may arise between employers and workmen, education is necessary to protect the interests of the laborer in these adjudications. None but the educated will submit their interests to the decision of others, and none but educated laborers can wisely determine what awards to give. The board might as well be entirely composed of capitalists, as to be a mixed commission, made up of educated capitalists and ignorant workmen—for the unenlightened would only be ciphers to give weight and force to a one-sided decision of their associates. In the fierce competition of manufacturers, smaller establishments are forced out of the field. The superior advantages of larger factories by the division of labor and by the saving in the expense of machinery, thus reducing the cost of production, are forcing mechanics more and more into these larger companies; and all the evils of combinations and agreements, by which contending parties are selfishly struggling for their respective interests, are more and more to be apprehended.

Nor is the danger of strikes and combinations confined to mechanics. Farmers are called upon to enter into combinations to protect their interests against powerful monopolies or combinations of those who stand between the producer and the consumer. And uneducated farmers may be instigated te acts as unreasonable as those which ignorant mechanics have blindly done when roused to frenzy by the supposed injustice of their employers. Selfish demagogues are ready to stir up the passions of Grangers, and induce them to commit acts of injustice or folly, if the agitators are to benefitted. Sovereigns of Industry may be patronized by greedy cormorants, who would ride into power and office on the tide of excitement; what care they for the destruction of the whirlwind, if they are lifted into notoriety? Without some knowledge of the principles of political economy, the measures proposed by those associations that honestly desire the highest welfare of the producing class, will often prove unavailing or deleterious. Desirable results cannot be secured by a violation of natural law, or of the laws of political economy.

A few years since certain carriage makers that needed some special aid in their business, petitioned the Legislature to protect honest labor against the competition of the convict labor in the State Prison; provision was accordingly made that the carriages manufactured at the prison should not be sold in this State. The product of convict labor was, therefore, disposed of in the wholesale market at Boston. The result of this restriction on trade was beneficial neither to the manufacturers nor to the consumers; the same steamboat that transported the carriages to be sold at wholesale in Boston, brought them back on its return trip, to be retailed in Bangor, the home of the petitioners. To the purchaser of cheap carriages, the extra cost of a two-fold sale and a double transportation, was not penalty enough to force him to encourage honest industry, by paying more for carriages than they could be bought for in the market.

Rather than to rail at middle men, because some sharper with oily tongue has induced the farmer to sell his hard-earned products for less than their market value, it would be better for the producer to read enough of current literature to know what is the state of the markets and the probabilities of a decline or advance in prices.

The restrictions of legislation on the production or exchange of commodities are of doubtful utility. It requires something more than an act of Congress to induce a better style of life, and to insure the prosperity of farmers and mechanics. No external circumstances or artificial appliances can supersede the necessity of intelligence, industry and economy, for true success.

The mere association of laborers, however pleasant, is not sufficient to improve their condition, if it does not promote intelligence. It may well be asserted that trades-unions and other organizations of workingmen have done more harm than good to the members, when these associations have undertaken to regulate the hours of labor, the rate of wages, and the privileges to be accorded to workmen. The attempt of a combination of interested parties to dictate terms to employers, or to prescribe to them rules of conduct, will be met by combined power of capitalists to resist the arrogant demands.

Intelligence is necessary to raise the industrial class—not merely to make them more skilled artizans, but to develop a nobler manhood,—and this itself will make labor more productive. But vigor of intellect depends largely on the method by which the mind is trained. It becomes therefore of great importance to know what kind of an education is best adapted to the wants of farmers and mechanics.

The importance of our common school education cannot be over-estimated. It is easy to criticise the defects of teachers, and any one can imagine that some needed improvements will soon add much or greater efficiency in the work of primary instruction. Each one that discusses this subject has some pet hobby; one would have music taught to every child—another thinks drawing the basis of all study—another would introduce some patent method of reading—and another would change all the text-books or discard them entirely. Although these projected improvements have not yet been fully adopted, we think highly of our common schools; we look back on the minds trained up here for usefulness and power, and rejoice to know that Maine scholars are prominent leaders in education in all the States of the Union. To advance the interests of our public schools, special institutions have been called into existence, whose object is to increase the efficiency of teachers. Normal schools give free instruction to those who are to make teaching their business. By directing public attention to the importance of securing competent teachers, by elevating the standard of required qualifications in candidates for this important profession, by presenting superior methods of teaching and furnishing suitable appliances and by systematic training, much has been accomplished in the improvement of our primary schools. Our State has taken another step in advance by adopting the system of "Free High Schools." Here a more generous provision is freely made to supply to all who wish a more advanced course of study than was formerly afforded by public expenditure.

The seminaries and colleges where the highest forms of education can be obtained, have been under the control of private corporations or religious denominations, and many plausible reasons have been assigned for this illogical division of educational work between the church and the State. The liberal education of the classical college is not adapted to the wants of the producers, and therefore unless some other liberal education is provided, the occupation of the farmer, which should be a liberal profession, will remain a most illiberal labor. All the declamation of orators about the dignity of labor will not change the fact that Agriculture is honorable just in proportion to the amount of mind and heart one uses in the employment. The man who aims only at the cultivation of the soil, while the soul is left barren, may succeed in raising large crops, but he is not worthy of honor. He may be looked up to as a farmer, but he is conscious that he lacks the elements which demand the respect of intelligent men. But why should not this grand primeval profession, honored by patriarchs and sages, and destined to be the occupation of the great mass of men, afford full scope to the highest capacities of our nature? Because we have allowed ourselves to believe that productive labor was not consonant with the highest development of thought.

The grandest triumphs of human intellect have been in struggling with fire, air and water. These have been made to reveal their secrets and to bow submissively to man's control. They do his bidding—they are inspired with his soul, replete with his intelligence—their service ministers to his delight and to his honor. But while these elements thus ennoble those most intimate with their properties, the earth seems to degrade her associates. Jupiter, Pluto and Neptune, are liberal with their honors; but Terra, like a harsh step-mother, enslaves her children. They ask, "how can he get wisdom that holdeth the plow, and that glorieth in the goad, that driveth oxen and is occupied in their labors, and whose talk is of bullocks?"

But is this state of degradation and servile toil a necessary condition of the tillers of the soil? Long ago the Roman historian said it was a question whether military success was due more to the vigor of mind or strength of body. Who asks that question now? The Grecian king well said he would rather have an army of stags with a lion for commander, than an army of lions with a stag for commander. In farming, the vigorous brain is worth more than the brawny muscles. The poetess says, "earth waits her queen." Rather say, the rich dowered earth waits for her coming lord, who with a lover's tenderness may woo her to disclose her charms; with a devotee's ardor may be absorbed in her delights; and with a master intellect may control her spirit. The accepted husbandman will be neither a cringing slave, nor a capricious tyrant, but a prince adorned with the benefactions of science. To him, earth will look up with a smile, and own his rightful sway. He may exult in the favors she bestows, and rejoice in a beauty he ever seeks to adorn, and in the wealth with which she is endowed. How inviting this adventure! But no faint heart will here succeed. The patient preparation, the unswerving fidelity, the life-long devotion are all demanded.

The farmer's occupation has especial advantage for a life of thought. Other occupations confine the laborers, for the most part, shut up in dingy shops, to one dull monotonous routine, where few mental faculties are cultivated. But the many-sided life in the open air and glad sunshine demands of the farmer a wide exercise of intelligence, as he "holds communion with nature in her visible forms," and watches the mysterious changes whose operations he directs; while every muscle is brought into healthy and varied exercise, every faculty of his soul is brought into full use.

But to become a master in his profession, he must have an education, which is at the same time liberal, and rightly adapted to his calling. No narrow technical drill, no mere professional training will suffice, nor will theoretical and scientific education alone accomplish the desired result. It must be a *practical* education—not in that narrow mercenary difinition of practical, which weighs all things by their exchange value, but in that true sense, the practical development of faculties by use for higher capability. It is mingling the highest thought with the labor of the hands to make the product more profitable to soul and body.

The farmer may get a living without a liberal culture, if he is content to spend all his days in getting a bodily existence. His grounds may bring forth abundantly; he may pull down his barns and build greater and think to feed his soul with their contents—that is not life, such an existence is of the earth, earthy.

As we look back on the past history of agriculture and the condition of farmers, and compare the former days with these, the most interesting point of contrast is not so much between ancient and modern means and appliances, comforts and conveniences, breeds of cattle and farm utensils, fertilizers and drainage, buildings and wealth, but between the intelligence of farmers in this and in a former age,—the education of the farmers a hundred years ago and at the present time. There were no agricultural books or papers then; see the quantity of such reading now in the market! No agricultural science then,—now the best thought of the age is turned to investigate the nature of soils, the principles of plant-growth, and the methods by which an increased production may be secured with the least expenditure. Half a century ago, professional men of other callings, lawyers, ministers and doctors, were the best agricultural writers, having little practical knowledge or skill in farming by which they could correct their fanciful theories. Now we have not only amateur farmers to write for us dainty disquisitions, but agriculturists, thoroughly educated in the college and on the farm, who find the benefit of applied science in their own practice, and are ready to communicate the rich treasures of their information to their brother farmers.

To increase the number of liberally educated farmers, to promote agricultural science, and to improve the condition of those who cultivate the soil, agricultural colleges have been established. There is a demand for such institutions. Many of our young men of excellent natural endowments, instead of rushing into the over-crowded professions, are resolved to fit themselves for a successful life of productive industry; as success depends on intelligence, they wish for the best training, that education which will alone ensure an honorable and a profitable career. They require the best instruction in the science of agriculture, and in the art of farming, therefore work on the farm must be united with the studies of the recitation room; and lectures on science must be illustrated by experiments performed in daily manual labor by the students. Labor is one of the gifts of God, and the scholar who in the midst of his intellectual culture is afraid to soil his hands, will never be educated for industrial pursuits. If one is ashamed of the appropriate dress for coarse work, or shrinks from the odor of the barn yard, let him not venture to breathe the gases of the laboratory, nor penetrate into the mysteries of the dissecting room. Pass him over all redolent with musk in dandified attire, to the drawing room, to lounge away his time in talk about vulgar employments of rustic laborers.

Work is not so attractive that students will engage in systematic, useful, manual labor, without it is made compulsory —a part of the regular college course; or unless they are compelled to work in order to secure the funds for their support. A serious difficulty in our colleges is, that students who do not labor are inclined to feel themselves to be superior to those who must work. The superciliousness of those freed from manual toil, especially where they happen to be in the majority, is unendurable to a high spirited, enterprising and sensitive scholar, who has to work with his hands to pay the college bills. Such students are often forced into class expenses they can ill afford; and frequently the best scholars feel compelled to abandon their course of study before graduation. There should be a college where all who really desire the boon, whatever their circumstances in life, may obtain a liberal education and pay at least part of their expenses by their work, thus rendering them better fitted for productive employments.

To meet this want of some available method to secure superior culture for energetic young men, is the design of the Maine State College. The institution has a double work assigned to it; it is an agricultural college to teach the science of farming, and an institute of technology to teach the mechanic arts. The student enters after passing an examination similar to that required in other colleges. The standard of qualifications for admission is not as high as could be wished in order to produce the most thorough scholarships in the course, but it is as high as can well be attained in our free high schools. The first two years are spent in those studies which are preparative and adapted to lay a thorough foundation for subsequent professional studies. During this time the student is acquiring a good knowledge of the ordinary college curriculum in literature, mathematics and the physical sciences. His reasoning powers become developed by the advanced mathematics, his perceptive faculties sharpened by scientific investigations, and his power of expression greatly increased by the studies in language, embracing with the English the study of the French and the German. The next two years are divided into distinct departments of study. Those designing to take the agricultural course have such studies in applied science, as may best qualify them for successful and intelligent farmers; together with lessons in mental and moral science, and in other branches essential to a thorough education. We are sorry there are no more applications for this department.

As one-eighth of the property of the United States is in railroad corporations, and as such momentous interests are connected with the transportation of freight and passengers, there has been a demand for an especial education; and the training of civil engineers receives prominent attention at the college. In this department theoretical instruction is combined with work in the field and the use of instruments. Thus the graduate goes forth prepared for successful work.

In mechanical engineering there is the same thorough instruction in applied science adapted to the wants of the engineer. In the chemical laboratory he can make analyses of ores and metals and materials, while with the philosophical apparatus he can make experiments that have a bearing on his profession. He visits machine shops, takes measurements of engines, makes accurate plans of the different parts and of the whole machine, and learns by their construction how to frame original designs of machinery and apparatus. But to complete this course one great want has been felt. With all this wealth of information, mental discipline and scientific training, there is no opportunity for one to acquire that manual dexterity without which his knowledge is of no practical use. The graduate goes forth from college, not into business, but to take the lowest position in a machine shop. In the minute subdivision of labor he may spend a lifetime, before he has opportunity to attain ordinary skill in all the different departments. What we most need is a shop of instruction, where manual dexterity in the different processes can be surely attained in a short time, by a regular gradation of practice from the most simple to the most complex exercises, conducted by experts in the several kinds of work. Nor need this be attended with great expense for a shop, machinery and the wages of experts to instruct the pupils a few weeks each year.

A chemical course of study has been arranged for those who wish to become thorough practical chemists.

From the different studies in all the departments a prescribed course in literature and science has been carefully selected, to meet the wants of those students who would lay the firm foundation of an education more general in its nature than the technical training acquired by some definite calling. All the young men labor on the farm during the first year. In the other years they have educational work, in the field, in the laboratory or in the drawing-room. All of them, through their whole course have regular exercises in military tactics.

Such are the provisions made for supplying the demand of this age for the liberal education of those who are determined to fit themselves fully for leading positions as farmers and mechanics in the State of Maine. A course of training has been provided where the theoretical, empirical and practical science are judiciously mingled. The question is asked, what is the result of this education, do the students engage in productive employments after leaving college! The first three classes that graduated prior to 1874 were small; as the college was then struggling for existence. The whole numbers of graduates in these classes was nineteen. Of these four are now farmers, three machinists or manfacturers, four are civil engineers, four are teachers, two, merchants; one is an editor, and one having been an apothecary, is studying medicine. A larger number than the graduates left college before completing the course of study; a large proportion of these are farmers. Of the last three classes, consisting of sixty-eight graduates, it is too soon to determine what will be their permanent occupation, as most of them are temporarily employed in teaching. Those designing to enter upon productive labor are obliged to earn money before settling down to their life work.

If the results are not what the most sanguine friends of industrial education have anticipated, they are certainly encouraging to every one whose interest in the subject has led him carefully to examine the working of the institution. We expect that harsh criticisms on the methods and aims of the college, will come from those with illiberal prejudices, who would confine the whole education to manual dexterity and muscular development; from the jealousy of those instructors who think the new education a rival of classical learning; from unscrupulous partizans, exciting the prejudices of the ignorant with the cry of economy, and from all who think learning will spoil a farmer or a mechanic.

The Maine State College should have connected with it an experimental station, well sustained; where an accurate test of fertilizers and soils, as well as methods of cultivating plants, of breeding animals and of feeding stock, could be made. As far as the limited means would allow, this has been done; but so far as farm work is made experimental it ceases to be profitable to the institution in dollars and cents; its richer returns are correct principles of science, whose application secures wealth to the farming community. The one who gets his living from the soil cannot afford to try costly and elaborate experiments. He has not the means at command for a successful test. The farmer has his traditional prejudices that are to be overcome, and the scientist has his wild vagaries that need to be rationalized by intelligent trial. The scientific French engineer, who on the first trial went crushing through the iron bridge he had constructed on an improved plan, crawled out from the debris of his ruined work, and escaping from the midst of mangled bodies and excavations, after two days made his appearance with exultation, exclaiming, "I have found it, I see the cause—the theory is all right, only I put a plus sign where there should have been a minus." The unhappy farmer will be likely to find untried theories all right, only there is a fearful minus where he wanted a plus—on the credit side of the ledger. When one boasts that he can carry enough concentrated fertilizer to dress an acre, in his vest pocket, we can safely predict he will be able to bring home all his increased product in the other vest pocket.

I would urge the importance of the higher education of farmers and mechanics, because I firmly believe this instruction would greatly increase the efficiency of productive labor; and especially would I urge it from the higher considerations of the worth of such an education to man himself. I enter into no computation how much college studies will increase the property of the individual and the wealth of the nation. I rather seek to know how much they will advance the civilization of society, the refinement of manners, the growth of intelligence, the happiness and the glory of humanity. These studies are a refuge in adversity and an ornament of prosperity; they hinder no useful work on the farm, and they will go with one when called to stations of honor or responsibility; they are a guide in darkness, an aid in duty, and a solace in sickness; they are adapted to the ardor of youth, and they shed a halo of glory around the hoary head; they are the ripe fruit of civilization, ministering alike to material wealth and comfort, to intellectual strength and to moral advancement.

THE STUDENTS' EXERCISE.

On the afternoon of Thursday, Oct. 18th, the last day of the Convention, the time was wholly occupied by the students of the State College, and it proved one of the most interesting sessions of the Convention. In accordance with the vote of the Board, which is given in full in the Introduction to this volume, the students of the college reported the results of some of the experiments which have been carried on at the college farm, a selection from them being given below. Others would have been published had the space at disposal for this matter been more extended.

I. STOCKBRIDGE'S FERTILIZERS ON CORN. By P. Keyes, Jr., Richmond.

It has ever been a trait of the human mind to seek for new devices from which to derive benefits, either directly or indirectly. It appears to be just as natural for man to search for new principles, as it is for water to flow from high to lower ground. New ideas and principles tend to interest and open to the mind through conjecture, the possibility of something that may yet be developed. The field of science has never failed to furnish labor for all who have wished to work, and many and valuable have been the results of their toil.

Among all the branches of science, agriculture is not the one that is receiving the least attention. I think it is safe to say, that at the present time, in many respects, agriculture stands in the front rank. Many of its most important facts have recently been discovered, and to-day several of our most distinguished scientists are carefully investigating different topics, which, when thoroughly understood, will add much to agricultural knowledge. In fact, agriculture is fast becoming a scientific study, instead of the blind traditional practice of former times; and we hope the time is not far distant when the agriculturist will no longer grope in darkness, but illuminate his path by acquainting himself with the principles on which his vocation is based. Before entering into the details of this experiment, it may be well to notice some of the principles of plant nutrition.

Plants require for their nourishment both organic and inorganic matter, and as far as the plant is concerned, one class of matter is of no more importance than the other. All of the organic elements (carbon, oxygen, hydrogen and nitrogen) are absolutely necessary for plant food, and no one of these elements is of more importance than another; a plant cannot be produced if any one is absent. So far as the cultivator is concerned, that element which nature provides in least quantity in an available condition, and which the plant requires from him in greatest proportional quantity, is of the greatest importance, and that is nitrogen. The substances in most soils in large quantity, when compared with the food-want of the plant, and in an available condition, are lime, soda, magnesia, sulphur, chlorine, scilica and sulphuric acid; while those contained in most soils in small quantity in available form, compared with the wants of the plant, are potash and phosphoric acid. These are soonest exhausted, and if cropping be continued must be artificially supplied. By a careful analysis of a plant of the kind to be grown, it now becomes easy to supply these substances in the exact proportion necessary to produce the plant. Aided by these facts, which have been established only after the most searching and acute investigation, oft repeated, Prof. Stockbridge has carefully prepared his fertilizers. It is maintained that they will produce certain results, and it remains for us to test them for ourselves.

The ground on which this experiment was tried, is sandy loam; slopes toward the west, rendering the drainage quite complete. It was broken from the sward in April, 1876, and lightly dressed with manure from the sheep pens, then sown to oats. In the autumn following the ground was again plowed, and also in the spring of 1877, the turf being well broken by harrowing. The witch-grass roots, of which the ground was full, were raked and hauled off, then half of the fertilizer used was sown broadcast, and harrowed in with Shares' cultivator harrow. The furrows were made lengthwise the piece, with Chandler's horse-hoe, leaving the rows three feet and a half apart; then a light marker, with teeth two feet apart, was drawn at right angles with the furrows. At each of the points of intersection, five kernels of corn were planted, covered with about two inches of soil. This was done from the 15th to the 18th of May.

About half the field of corn was planted with seed sent to President Allen from New York State, by Mr. C. H. Curtis, known in that vicinity as "Red Glaze Yellow," having been cultivated for thirty years—the earliest selected each year for seed, for the purpose of obtaining thereby an early variety. This corn ripened nearly two weeks earlier than did the corn on the other half, the seed of which came from Nobleboro', sent by L. H. Winslow. The corn came up quickly, and presented a dark green appearance; numerous hills were tinged with dark purple, the cause of which is not known. The remainder of the fertilizer was applied, one-half the 23d of June, and the other half in July, each application being made by hand; the fertilizer was strown between the rows and hills. It was necessary in order to keep down the witch-grass, to make frequent use of the hoe and cultivator. In this way the land was thoroughly stirred and kept from weeds.

A piece of ground planted beside the one just described, received no fertilizer, and will show by comparison the increase where fertilizer was used. The weight of corn raised from the seed from New York, where fertilizer was applied, yielded on an average of 5,850 lbs., or about 61 bushels of shelled corn per acre; where no fertilizer was used it was on an average of 4,633 lbs., or nearly 49 bushels. The weight of corn harvested from the seed sent by Mr. Winslow, where fertilizer was applied yielded at the rate of 5,639 lbs., or 59 bushels per acre; the same without fertilizer, produced 3,807 lbs., or 40 bushels per acre. The average yield where fertilizer was applied, was 5,720 lbs., or 60 bushels per acre; where no fertilizer was used the yield was 4,221 lbs., or 44 bushels. The gain per acre where fertilizer was applied, over that where none was used, was 1,511 lbs., equal to nearly 16 bushels. The tops were weighed, and found to be about 74 ounces heavier where fertilizer was applied than where none was applied. The quality of the corn grown with fertilizer was decidedly superior to that grown without, being better ripened, so that a part of the weight of the unmanured corn is due to its unripe condition, making the actual increase not less than 20 bushels per acre.

Considering the butts to be in the same proportion where fertilizer was used, regarding weight, the value of the stover would be at least three-fourths more where fertilizer was applied. Reckoning the weight per acre of stover where no fertilizer was used to be two tons, and this worth six dollars per ton, we have a gain of nearly nine dollars on the stover by using fertilizer. The cost of fertilizer per acre was twenty-two dollars; this less the gain on the stover above the natural yield, leaves thirteen dollars as the cost of the sixteen bushels gained. This shows the cost per bushel to be about sixty-five cents.

The ground was regarded as in a poor condition, when plowed producing less than a half ton of hay per acre, and it is a wonder why it produced so much corn without fertilizer. On ground possessing less natural corn-producing qualities, the gain from using the fertilizer would doubtless have been more marked than shown by the present experiment.

II. REPORT OF EXPERIMENTS IN FEEDING SWINE. By S. P. Merrill, Auburn.

The series of experiments of which the following is a brief report, was commenced by Farm Superintendent Johnson in the year 1870, and it has been continued by him and his successor until the present time. The purport of the experiments being to determine the relative value of cooked and uncooked meal as food for swine.

On the 15th of January, 1870, Mr. Johnson selected four Chester pigs, of the same age, and nearly of the same weight, and placed them in two separate pens. Those in pen No. 1, were fed on warm scalded meal, and those in No. 2 on the same quantity of raw meal. On weighing the pigs the 18th of the following February, it was found that the gain in each pig had been the same—seventy-five pounds. The manner of feeding was then reversed, and the pigs in pen No. 2 were fed on scalded meal, and those in No. 1 on raw meal. Thirty days later the pigs were again weighed, and it was found that the two fed on scalded meal had gained 108 lbs., and those on raw meal but 100 lbs. The result of this trial would at first appear to be considerably in favor of the scalded meal, but one of the pigs fed on the raw material had for some unknown reason been falling behind, and during the last thirty days had gained but 46½ lbs., while his mate had gained 53½, or only three-quarters of a pound less than the average of those fed on scalded meal. During the thirty days ending April 18th, those fed on scalded meal gained 99½ lbs., and those fed on raw meal 122 lbs. The result of this last trial gives the comparative value of warm scalded meal to that of cold raw meal, as 95½ to 100.

On May 23d, 1871, another trial was begun, and continued for ninety days. This gave the comparative value of cooked to uncooked meal, as 74 4-5 is to 100.

For the purpose of continuing the experiment, on the 25th of June, 1872, three White Chesters were selected from the same litter, when seven and a half weeks old, weighed and placed in adjoining pens. The food was prepared as in the preceding trials, and the same amount fed to each pig daily, the quantity being gradually increased as their appetites demanded it.

A greater increase in weight was obtained this year, but the relative value remained nearly the same, being as 82 is to 100 in favor of the raw material.

June 30th, 1873, three White Chesters from *separate* litters and differing in both age and weight, were selected and treated precisely as were the others, with the exception that for the first four weeks no milk or any food of any kind, excepting meal, was given them, whereas, the others had occasionally been furnished with a little milk. At the end of the twelfth week, pig No. 1 being in poor health, was dropped out of the experiment. The result of this trial, as in the last, was in favor of raw meal. The average cost per pound of increase obtained by feeding raw meal, was to the average cost per pound obtained by feeding cooked meal, as 100 is to 109.

July 8th, 1875, three pigs of mixed breed, being three-fourths White Chester and one-fourth Suffolk, were taken from different litters, being nearly the same age, and not varying more than a few pounds in weight. They were kept in separate pens, each with an open yard connected. Their food consisted entirely of meal, either cooked or uncooked, with occasionally a quantity of grass and weeds. In this experiment the method of alternating the kind of food was adopted; that is, pigs Nos. 1 and 2 were fed for four weeks on cooked meal, and No. 3 on raw meal. Then this was reversed and No. 3 received the cooked meal, and Nos. 1 and 2 the raw meal. The entire gain of each pig was of course not so great on account of the sudden and complete changes in the diet; but by noting their weights at the end of every four weeks, or every time that a change of food was made, a much more satisfactory test as to the relative values of these foods could be obtained, than if each pig had been confined to one particular kind of food during the whole time. As before, we find the result in favor of raw meal, though the difference is not so marked. The average value of raw, compared with cooked meal, was as 100 is to 101.2.

The following year the pigs selected were a cross between a Yorkshire boar and a White Chester sow. They were all from the same litter, and were eight weeks old at the time of commencing the experiment. The method of alternating the kind of food was adopted, as in the preceding trial, and continued throughout a period of twenty-four weeks. The food was of the same kind as in previous trials, with the exception that the meal was mixed with about sixty per cent. of its weight of skim milk. The result in this case shows a much greater difference in favor of the raw material than any heretofore obtained. The value of the cooked being to the uncooked as 100 is to 130. In the concluding trial, a comparison was also made to ascertain the value of milk as food, compared with raw meal. The four pigs chosen were of the same breed as the last, a cross between a Yorkshire boar and a White Chester sow. Three of these were fed alternately on cooked and uncooked meal, and the fourth on milk. The result with those fed on meal was as 100 is to 102½ in favor of the raw material. Milk compared with meal was as 1 is to 2 2-5 in favor of meal.

III. Top Dressing for Grass Land. By J. D. Cutter, Brewer.

Grass is the greatest agricultural product of Maine and of the United States. The average yearly crop is estimated to be worth seven hundred millions of dollars. Would it not pay for the farmers of Maine to give more of their attention to hay raising? There are thousands of acres of land under cultivation to-day that do not cut more than one ton the acre, and many more that do not cut one-half a ton. Why is this, when the same land can be made to produce from two to three tons to the acre? The reason is, that the farmers do not apply enough manure to the land. Some say, "Manure costs money, and we cannot afford to buy it to put upon our land." It would be better to put what surplus money a farmer has at the end of the year into manure for his grass land, than into the bank, for it would then be secure, and pay better interest. Some farmers manure land for a certain crop, and then seed it down to grass. They keep taking off the hay, year after year, without returning an equivalent in the shape of some kind of manure, and consequently the land grows poorer each season. It would be better to return each year that which the grass appropriates in growing, and thus keep up the standard of production, or raise it higher. The important question is, what kinds of manure shall we use? The following are the kinds used in an experiment at the College farm in Orono. The experimental plots are each two rods square, containing 1-40 of an acre. They are staked out in two rows, four plots in a row:

MANURES.	Rate per acre.	1873. Weight of Hay.	1874. Weight of Hay.	1875. Weight of Hay.	1876. Weight of Hay.	1877. Weight of Hay.
Cow manure............	Five cords.	63 lbs.	150 lbs.	182½ lbs.	122 lbs.	75 lbs.
Horse manure	"	71 "	127 "	152 "	102 "	50 "
Fine old muck..........	"	83 "	148 "	117 "	76 "	45 "
Fine old muck and salt..	Salt, 3 bush.	73 "	121 "	108 "	67 "	35 "
Plaster................	2 bushels.	51 "	115 "	79 "	33 "	30 "
Wood ashes.............	5 bushels.	81 "	97 "	103 "	56 "	35 "
Salt...................	3 bushels.	87 "	92 "	101 "	43 "	25 "
Nothing................	–	87 "	88 "	88 "	46 "	40 "

The muck was taken from a swamp four feet deep, and exposed to the air one year. We see by the table that the average yield was best where the cow manure was applied. Next, in case of the horse manure, and next where the muck was used alone—while the plots where the other fertilizers were applied yield on the average about the same amount as where no application was made.

IV. Different Methods of Cutting and Planting Potatoes. By W. E. Ferguson, Bangor.

The following experiments, comprising the different ways of cutting and planting potatoes, were originated in connection with the Scientific Society of the Maine State College, in the hope that the methods proposed will be tested, not only at the College farm, but also by farmers in other parts of the State, that by comparison of results obtained under conditions widely differing from each other, definite conclusions may be reached, which shall be of real value to those who wish to practice the best methods of planting potatoes.

The potatoes used for seed were classed as follows: Large, those weighing seven to eight ounces; medium, those weighing three to four ounces; small, those weighing one to two ounces. Where not otherwise stated, large potatoes are cut into four pieces; medium are cut into two pieces, and one piece dropped in a hill. These experiments were arranged with reference to the following conditions, which I will briefly consider under separate heads:

1st—Potatoes divided through the centre, and the product of the seed end and the butt end compared. By comparing the results obtained for the past five years, I find them in favor of the butt end for seed. It gave the largest yield in every trial but one, and a greater per cent. of large potatoes in every trial.

2nd—Large, medium and small potatoes compared, the seed planted each year to be the product of potatoes of a like class. The results seem to be in favor of the medium sized sets, as will be seen by these figures: Large yielded 79½ lbs., medium 82 7-9, lbs., and small 58½ lbs. The large sets yielded about as many potatoes as the medium, but more small ones. The small sets gave a very low yield compared with the other two.

3d—Large, medium and small compared; the seed to be selected from an ordinary pile of potatoes, taking the average result for five years. I find it quite different from the preceeding experiment, the small sets giving heaviest average yield, being 64¼ lbs., the medium next, yielding 61¼ lbs., and the large only 54 lbs.; the large sets produced the least small potatoes, the medium and small sets produced about the same amount of small ones.

4th—The product of large potatoes compared when planted six, twelve, eighteen and twenty-four inches apart in the row, the average result for five trials are as follows: Those planted six inches apart yielded 81¾ lbs., twelve inches 70 lbs., eighteen inches 75¼ lbs., and twenty-four inches yielded 67½ lbs., showing that six inches apart gave the best results on an average; but this year the best result was obtained from those planted eighteen inches apart; while in 1875 and 1876 those planted twenty-four inches apart gave the best results.

5th—Equal weight per acre, of large, medium and small potatoes planted at equal distance, taking the average for five trials I have the following results:

				Total.	Large.
Large gave an average of				18 3-5 lbs.	14 7-8 lbs.
Medium	"	"	"	17 1-5 "	14 1-3 "
Small	"	"	"	16 2-5 "	9 1-2 "

The result being in favor of an equal weight of large potatoes for seed.

6th—Seed placed on the surface, and covered to the depth of two, four, six, and eight inches. There is not so great a difference in the yield as some would suppose. Those covered four inches deep gave the largest average for the five seasons, being 19 lbs., also the average per cent. of large potatoes. The next best yield were those planted eight inches. Average yield for two inches, 17 lbs; four inches, 19 lbs; six inches, 18 lbs; eight inches, 18½ lbs.

7th—Seed planted below the surface two, four, six and eight inches and covered to same depth. There seems to be a marked difference in the results of this experiment:

The average	yield	for	five	years,	below the surface,	2	inches,	16 lbs.
"	"	"	"	"	"	4	"	17 1-2 "
"	"	"	"	"	"	6	"	12 1-2 "
"	"	"	"	"	"	8	"	12 lbs.

showing a rapid decrease below four inches.

8th—Medium cut to two parts and the product of one part in a hill, compared with two parts in a hill. The result of this experiment, averaging the results of the five trials, is in favor of planting two parts in a hill, as regards quantity, but one piece gave the greatest per cent. of salable potatoes; one part gave an average of 16½ lbs., two parts 17 lbs.

9th—Medium potatoes, planted whole, compared with the same cut to two eyes, and one piece planted in a hill. Medium potatoes planted whole gave the heaviest yield on an average, for five years, but the results varied considerably, sometimes being considerably in favor of whole potatoes. In 1874, the result was the same, while in 1875 those cut to two eyes, gave much the larger yield, and in every trial gave the largest per cent. of salable potatoes. Whole sets on an average 13 lbs; cut to two eyes on an average, 11½ lbs; large 9; 8 in favor of cut.

10th—The amount of potatoes produced by planting in flat hills, compared with the amount produced from pointed hills. The latter gave the best yield in every trial, average 19½; 16¼ in favor of pointed hills, the result from pointed hills gave the largest per cent. of large potatoes.

11th—The product of potatoes planted in small hills compared with the product of potatoes planted in large hills. The average results is as follows: Small hills 17½ lbs., large hills 16½ lbs. The per cent. of large potatoes about equal in both.

12th—Large potatoes cut to two parts; the product of one piece in a hill compared with two pieces in a hill. One piece equal 19½ lbs., two pieces equal 19¼ lbs., showing but very little difference in the average yield of the two.

13th—An equal number of eyes planted in each hill, and an unequal number of stalks allowed to grow. Where there were only two to four stalks allowed to grow the yield was the best, and the potatoes were of a larger size than where more than four were allowed to grow.

V. Experiments with Fertilizers on Potatoes, Beans, and Ruta-bagas. By G. W. Lufkin, No. Yarmouth.

It is a fact well known to nearly every intelligent farmer, that plants are composed of certain chemical substances, prominent among which are nitrogen, phosporic acid, sulphuric acid, lime, potash and magnesia. Now, it would seem at first thought, if we wish to fertilize a certain crop, we had only to apply these elements to the soil in the proportion in which they are found in the crop. But the soil may be deficient in some of these elements, and have an abundance of others. For instance, magnesia is found in sufficient quantity in the poorest soils; sulphuric acid and lime are more often deficient, but can be restored very cheaply by the application of sulphate of lime or plaster; phosphoric acid may be wanting, while potash is in excess. It would be the height of folly to apply a fertilizer which the soil already had in abundance. The principal ingredients, however, both on account of their scarcity and high price, are nitrogen, phosphoric acid and potash.

The question now is, when is it necessary to apply these fertilizers, and how can it be done the most cheaply. This question can only be answered by experimenting on different soils and comparing results. The Connecticut Agricultural Experiment Station, observing the need of some such work, caused sets of the fertilizers to be prepared, which were furnished to a few persons willing to make a trial of them. Experiments with one such set, forms the subject of this essay.

The spot selected for this trial, was situated a little to the south of the new barn. Soil, a sandy loam. From the time it was cleared till it was broken up in the fall of 1874, it had been pastured. In 1875 it was summer tilled, and in the spring of 1876, received a light dressing of stable manure, and was sowed to a mixture of wheat, oats and barley. This spring, 1877, it received a light coat of stable manure, which was thoroughly cultivated in. After plowing, the ground was divided into strips 22 rods long by 3 feet wide, equal to 1-40 of an acre; between each plot was a space sufficient for a single drill. A drill was then made lengthwise of the plots, and the fertilizers were sown on the sides and bottom of the drill, and thoroughly incorporated with the soil by the use of garden rakes. Plot No. 1 received 20 lbs. dried blood, containing 10.5 per cent. nitrogen; No. 2, 20 lbs. dissolved bone black, containing phosphoric acid, 15 per cent..

soluble; No. 3, 20 lbs. chlorate of potassium, containing actual potash, 52 per cent.; No. 4, 10 lbs. each of dissolved bone black and dried blood, containing phosphoric acid 7.5 per cent., and nitrogen 5 per cent.; No. 5, 6⅔ lbs. each of dried blood, dissolved bone black and chlorate of potassium, containing nitrogen, 33 per cent., phosphoric acid, 5 per cent., and potash, 17 per cent.; No. 6, sulphate of lime, furnished by 20 lbs. land plaster; No. 7, 20 lbs. kainite, or sulphates of lime and magnesia; No. 8, 20 lbs. Bradley's Superphosphate; No. 9, 20 lbs., Cumberland Superphosphate, and No. 10, 20 lbs. Rafferty & Williams' Superphosphate. All the fertilizers were applied at a uniform rate of 800 lbs. to the acre. Each plot was divided into 3 equal parts, designated as sections A, B, C. Section A of each plot was planted to Early Rose potatoes; B, to yellow-eyed beans, and C was sown to ruta-bagas. Each unmanured plot was planted to correspond to the manured ones. The planting was done between June 7th and 9th.

Through the growing season, the nitrogen and phosphoric acid seemed to do best on the potatoes and beans. On the ruta-bagas, the phosphoric acid and the mixture of phosphoric acid and nitrogen did finely, while on those plots where the nitrogen and potash were used separately, the plants grew well till the middle of July, when for some cause or other they came to a complete stand-still. The potatoes were dug the 8th of September.

The following table gives the results of this experiment:

FERTILIZER.	Yield in weight.	Gain in yield over unmanured plots.	Cost of manure per acre.	Market value of increased product.
Nitrogen	61 lbs. 8 oz.	33 lbs. ⅝ oz.	$20 00	$49 50
Phosphoric acid	86 lbs.	57 lbs. 8⅝ oz.	21 00	86 40
Potash	52 lbs.	23 lbs. 8⅝ oz.	26 00	35 10
Nitrogen and phosphoric acid	79 lbs. 12 oz.	51 lbs. 4⅝ oz.	21 50	76 80
Nitrogen, phosphoric acid and potash,	77 lbs.	48 lbs. 8⅝ oz.	22 33	72 80
Plaster	56 lbs. 2 oz.	27 lbs. 10⅝ oz.	6 00	40 78
Kainite	36 lbs. 12 oz.	8 lbs. 4⅝ oz.	18 00	12 30
Bradley's Superphosphate	82 lbs. 8 oz.	54 lbs. ⅝ oz.	22 00	81 00
Cumberland Superphosphate	79 lbs.	50 lbs. 8⅝ oz.	22 00	75 90
Rafferty & Williams' Superphosphate,	63 lbs. 7 oz.	34 lbs. 8⅝ oz.	22 00	51 90
Unmanured	28 lbs. 7⅜ oz.	–	–	–

In this table the cost of applying the fertilizers is estimated at $2.00 per acre; market value of the potatoes, 75 cents per bushel. By examination, it will be found that the market value of increased production is greatest under phosphoric acid. Of the mixed fertilizers, nitrogen, and of the superphosphates, Bradley's, give the best results. Value of increased production is least under kainite. The greatest net gain from the use of fertilizers, phosphoric acid, $65.40 per acre; the least, potash, $9.10; while kainite shows a net loss of $5.70 per acre.

The beans were picked September 14th, and after being thoroughly dried, were threshed and weighed; the vines were pulled, and after drying were also weighed. The following table gives results:

FERTILIZER.	Yield in weight.		Gain in yield.		Cost of manure.	Value of increased product.	Value of loss in product.
	Beans.	Vines.	Beans.	Vines.			
	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.			
Nitrogen	1 10	2 14	3	1 5	$20 00	–	$16 09
Phosphoric acid	9 10	9	5	4 13	21 00	$27 60	–
Potash	2 2	3 5	2 8	14	26 00	–	13 24
Nitrogen and phosphoric acid	8 2	8 7	3 8	4 3	21 50	19 62	–
Nitrogen, phos. acid and potash	6 8	7 2	1 14	2 15	22 33	10 75	–
Plaster	6 2	6 1	1 8	1 14	6 00	8 43	–
Kainite	4 10	3 8	–	14	18 00	–	25
Bradley's Superphosphate	8 6	7 8	3 12	3 5	22 00	20 59	–
Cumberland Superphosphate	8 6	6 8	3 12	2 5	22 00	20 23	–
Rafferty & Williams' Superphosphate	8 12	7 2	4 2	2 15	22 00	22 39	–
Unmanured	4 10	4 3	–	–	–	–	–

The market value of the beans is estimated at $2.75 per bushel of 67 lbs. The market value of increased production is greatest under phosphoric acid. Of the mixed fertilizers, nitrogen and phosphoric acid give the best results; of the superphosphates, Rafferty & Williams'. Nitrogen, potash and kainite show a loss in production. The greatest net gain from the use of fertilizers, phosphoric acid, $6.60; the least, Rafferty & Williams' Superphosphate, $0.39. The greatest net loss, potash, $37.24; the least, Bradley's Superphosphate, $1.41. The increased product from any of the fertilizers, except phosphoric acid, plaster and Rafferty & Williams' Superphosphate, was not enough to cover their cost. The whole crop was not up to the standard, and it was hardly a fair experiment.

The ruta-bagas were harvested October 5th. The following are the results. As plots 1 and 3 failed to come to maturity, they have been omitted:

FERTILIZER.	Yield in measure.	Gain in yield over unmanured plots.	Cost of manure per acre.	Value of increased production.
Phosphoric acid	3 bush. 1¼ pks.	2 bush. 1¼ pks.	$21 00	$63 60
Nitrogen and phosphoric acid	4 bush. 1 pk.	3 bush. 2 pks.	21 50	104 40
Nitrogen, phosphoric acid and potash,	4 bush. 1 pk.	3 bush. 2 pks.	22 33	104 40
Plaster	2 bush. 1½ pks.	1 bush. 2½ pks.	6 00	49 20
Kainite	2 bush. 3 pks.	2 bushels.	18 00	60 00
Bradley's Superphosphate	3 bush. 3 pks.	3 bushels.	22 00	90 00
Cumberland Superphosphate	3 bush. 2 pks.	2 bush. 3 pks.	22 00	82 80
Rafferty & Williams's Superphosphate.	2 bush. 2 pks.	1 bush. 3 pks.	22 00	52 00
Unmanured	3 pks.	–	–	–

Value of turnips per bushel, 25 per cent. The market value of increased production is greatest under the two mixed fertilizers; while of the superphosphates, Bradley's gives the best result; it is least under plaster. The net gain from the use of fertilizers is greatest under nitrogen and phosphoric acid, $82.70; the least under Rafferty & Williams' Superphosphate, $30.80. With the exception of plots 1 to 3, this was a very satisfactory experiment.

By comparison of the several tables, it will be seen that phosphoric acid gives the best result, except in the case of ruta-bagas, where nitrogen and phosphoric acid is best. As a general thing all those fertilizers containing phosphoric acid succeeded finely. As the ground on which the experiment was performed was old pasture land, we may safely conclude that a large part of the phosphoric acid of the soil has been carried away in milk and bones of the cattle which grazed there. Considering the cheapness of plaster, it gives a fair result, while nitrogen and potash seem to be of but little value. Of the superphosphates, Bradley's seems to be best for potatoes and ruta-bagas, and Rafferty & Williams' for beans. It is, however, only carrying these experiments through a series of years, and comparing results, that we can hope to learn the true needs of the soil.

VI. The Sugar Beet. By D. S. Jones, Dennysville.

The sugar beet was first found in Turkey, growing in a wild state. It was introduced into France and Germany in the latter part of the sixteenth century, and cultivated to some extent. A few factories were started for the purpose of separating the sugar from the other constituents of the beet; but the process was slow and laborious, everything being done by hand power, and the machinery being very imperfect, a very large part of the sugar must have remained unseparated in the pulp or refuse, as the amount obtained was only from one to two per cent. of the weight of the beet.

But by the introduction of improved machinery, by the careful cultivation of the beet to obtain the largest per centage of sugar, and by the knowledge and experience gradually obtained by the producer and manufacturer, they at the present time obtain from seven to ten per cent. of sugar, and this, too, at a cost which enables them to compete with any country that obtains its sugar from the cane.

It is noticed by many writers on this subject, that in France those farms that take the principal prizes offered by agricultural societies, are those on which sugar beet culture is carried on. It requires deep tillage, clean cultivation and heavy manuring. The pulp is brought back to the farm and fed to stock, thus keeping up the fertility of the soil.

The United States has done but little towards its cultivation and manufacture, having at the present time but one manufactory in successful operation, which is in California. But looking at what it has done for France, and at the results of a number of experiments that have been conducted in our own country, we can see many of the benefits which she or even Maine would derive from it, if once successfully started and carried forward.

The main object of the experiment conducted by myself through the past season on the College farm, is to determine what variety of sugar beet, what method of cultivation and what fertilizers applied, will give the largest percentage of sugar at the least cost. Of course this cannot be determined by the results of one experiment, nor by those of two; but to determine it satisfactorily we must get the average of a number of them, and this will be *one* of the number.

The plot of land taken for the experiment was a piece upon which strawberries had been grown for quite a number of years. It has a slight easterly slope. The soil is a sandy loam. The strawberry plants were removed and the land deeply ploughed, about the 20th of May, 1877. It was then well pulverized and the stones and lumps of earth raked off. The plots were then staked off, each two feet square, and lying in pairs, as shown on the plan. May 24th, the fertilizers were applied. The rates per acre at which they were applied are given on the plan. As each plot contains one hundred square feet, the quantities applied to each would be $\frac{100}{43560}$ of those applied per acre. They were carefully reckoned and weighed separately, then mixed and applied broadcast as evenly as possible, each plot of the pairs receiving the same kind and quantity. Those applied on the first and second pairs, Nos. 1, 2, 3 and 4, were raked into the soil with a garden rake.

The barnyard manure on Nos. 5 and 6, was worked into the first eight or ten inches of soil.

The second part of those applied on Nos. 7 and 8, were worked into the soil about ten inches deep, while the first part was simply raked into the surface. The last pair received no fertilizer.

May 25th, the first plots of each pair, Nos. 1, 3, 5, etc., were marked by drawing an eight inch marker lengthwise and crosswise of them, making intersections eight by eight inches apart; and the second plots, Nos. 2, 4, etc., by drawing a ten inch marker lengthwise, and a twelve inch one crosswise of them, making intersections ten by twelve inches apart, in which the seeds were to be dropped. Each plot was then divided into three equal parts, as A, B, and C, making thirty sub-plots.

On A was planted Vilmorin's French White Sugar Beet.
On B " " Improved (imported) "
On C " Carter's Prize Nursery Beet.

Two seeds were dropped at each intersection of the marker, and covered by hand. They germinated well in all but the first and second plots, where a great many did not germinate at all.

About the first of July all the vacant places were filled, by transplanting the same variety from where more than one was growing at an intersection on the same plot. Soon after this they were thinned out, leaving one plant at each intersection, which in Nos. 1, 3, 5, 7 and 9, would be eight by eight inches apart, and in Nos. 2, 4, 6, 8 and 10, ten by twelve inches.

Summing up what has been done, we find that there are *five* different fertilizers applied, *three* varieties of beets growing, and *two* methods of cultivating the same, making thirty different results to be obtained. Nothing further was done to the plots, except keeping them free from weeds, until they were harvested October 6th. The beets from each sub-plot were weighed separately: first, the roots and tops together, and then the roots alone. About the tops: I will simply say that on No. 1 they weighed exactly the same as the roots, but in most cases they weighed from that down to three-fourths as much. The yields given pertain to the roots only.

It is now taken as a fact, having been proved by both scientific and practical experiment, that phosphoric acid, potash and nitrogen, are the principal, and in most cases the only constituents of plant food which are not found in abundance in the soil and air. These, then, must be supplied in an available form for the plant to feed upon, or after having taken up all of any one of these that the soil contains, it will cease to grow, no matter how many other kinds of plant food there may be for it to feed upon.

From a table made up of the average of a number of results obtained by European chemists, on the exhaustion of the soil by the different crops, we find 1000 pounds of sugar beets take from the soil:

Roots,	Phos. acid, 0.8,	Potash, 3.9,	Nitrogen, 1.6
Tops,	" 1.3,	" 6.5,	" 3.0

The three pairs, Nos. 1 and 2, 3 and 4, 7 and 8, on which the commercial fertilizers were applied, have superphosphate, muriate of potash and plaster, common to all. The plaster contains a large quantity of lime and of sulphuric acid, but is used here principally as an absorbent of the ammonia gas in the air; and it also acts upon the potash which is in the soil, and renders it in a suitable form for plant food. The superphosphate supplies the phosphoric acid, and the muriate of potash the potash in available forms for the beet to feed upon. Let us now look at the sources from which the nitrogen is obtained.

On the first pair, Nos. 1 and 2, nitrate of soda, containing about 15.5 per cent. of nitrogen is applied at the rate of 500 lbs., containing 77.5 lbs. of nitrogen per acre.

On the second pair, Nos. 3 and 4, sulphate of ammonia, containing 20 per cent. of nitrogen, is applied at the rate of 400 lbs., containing 80 lbs. of nitrogen per acre; each pair receiving about equal quantities of nitrogen, 80 and 77.5.

On comparing the yields per acre of the two, we find No. 1 of the 1st pair yields 43,125 lbs.; No. 2 of the 1st pair yields 37,026 lbs.; average, 40,075 lbs. No. 3 of the 2nd pair yields 45,738 lbs.; No. 4 of the 2nd pair yields 44,867 lbs.; average, 45,302 lbs. Giving an average yield of 5,227 lbs. per acre in favor of applying nitrogen in the form of sulphate of ammonia, rather than in the form of nitrate of soda. It is said to be a fact, that nitrate of soda furnishes more available nitrogen to the young plant, and sulphate of ammonia to the old, than an equal quantity of nitrogen contained in either alone would furnish in an available form throughout its whole growth.

On the fourth pair, Nos. 7 and 8, that part of the fertilizers containing sulphate of ammonia at the rate of 200 lbs., which contains 40 lbs. of nitrogen per acre, was worked into the soil quite deep, being left in a suitable position to be taken up by the plant in the latter part of its growth. While that part containing nitrate of soda at the rate of 230 lbs., which contains 36 lbs. of nitrogen per acre, was left near the surface, or in a suitable position to be taken up by the young plant. Taking the sum of the quantities of nitrogen applied in both ways, we find it to be 76 lbs., or very nearly equal to the quantity applied to each the first and second pair.

On comparing the average yields per acre of these three pairs—average of Nos. 1 and 2, 40,075 lbs.; of Nos. 3 and 4, 45,302, lbs.; of Nos. 7 and 8, 48,787 lbs.; showing an average yield of 8,712 lbs. per acre in favor of applying nitrogen in the manner applied on Nos. 7 and 8, over applying a nearly equal quantity in the form of nitrate of soda as in Nos. 1 and 2; and of 3,049 lbs. over applying a nearly equal quantity in the form of sulphate of ammonia, as in 3 and 4. The average yield of Nos. 5 and 6 is 43,778 lbs. per acre.

Experiments have shown that in order to get the full benefit of barnyard manure it should be applied the year before the beets are grown, and that the sugar is not so easily obtained from the beets grown on it, as from those grown on the commercial fertilizers.

The average yield of Nos. 9 and 10, where no fertilizer was applied, was 47,262 lbs. per acre, which is next to the best. This is accounted for in some measure by the fact that it was the lowest pair on the slope, and received the wash from those above.

In regard to the variety of beet: The best average yield per acre was—

Carter's Prize Nursery, 61,298 lbs. = 30 tons, 13 cwt. (about.)
Vilmorin's French White, 39,144 lbs. = 19 tons, 11 cwt., 44 lb.
" Improved (imported) 34,439 lbs. = 17 tons, 4 cwt., 39 "

The average weight of each variety is as follows:

	Planted 8 by 8 in. apart;	10 by 12 in.;	Average.
Carter's Prize Nursery,	9 1-2 oz.	16 8-9 oz.	12 1-10 oz.
Vilmorin's Fr. White,	6 8-25 oz.	10 2-5 oz.	7 4-5 oz.
" Improved (imp.)	5 8-25 oz.	9 6-11 oz.	6 5-6 oz.

These figures show that Carter's Prize Nursery beet gave by far the largest yield and the largest root, although they were not of so handsome a shape, as a general thing, as the other varieties. The average yield of those planted 8 by 8 inches apart in the plot, was larger than that of those planted 10 by 12 inches apart, by 1,642 lbs. per acre. Of course they were smaller beets, but the number considerably larger would be obtained per acre.

Six of the medium sized beets were selected from each of the sub-plots, and packed in sand to be analyzed by the Professor of Chemistry in the College Laboratory, and the percentage of sugar contained in each ascertained, which will probably be reported in due season.

WHAT SCIENCE MAY DO FOR FARMING.

BY PROF. HENRY CARMICHAEL, BOWDOIN COLLEGE.

There seems to be the impression abroad, that the State of Maine is an excellent State to emigrate from, and that no man in the full possession of his senses would seek here his home. It is pictured as a land of terrible winters and inconstant summers; its coast, rock-bound and inhospitable; its interior a succession of barren hills; its inhabitants hugging their poverty, as the ivy clings to its mouldering support, and deluding themselves with the vain hope of better days. But these are the representations of strangers or of enimies; the experience of every one here present would, I doubt not, give them the lie. We need not take a physical chart in hand to show that the lines of equal, average temperature run with us not east and west, but along our coast, so that the climate of Portland shall be less severe than that of Albany, N. Y. So to those who have sound, well-nourished bodies, our winters have no terrors, and every summer brings within our borders hosts of tired strangers, who seek vigor from the favored atmosphere of our State. The frost, indeed, comes early and retires late, and yet there are few products of temperate climes that may not be raised here in excellence and quantity. Our water-powers, still untaxed, are capable of giving rise to a thousand industries. Rich mines and quarries abound. If beautiful surroundings be an inducement to residence, where upon our eastern coast, outside the State of Maine, may be found nature so nobly personified as at Camden, Castine, or Frenchman's Bay? Coming here in the evening, I have not as yet seen the village of Fryeburg, but I know its reputation, and I ask where will be found a place that better holds its inhabitants, and more attracts visitors by its scenery, its cultivation and its associations, than does this town?

Yet, it must be admitted that the tiller of the soil has here a laborious task. The earth requires more than a tickling with the hoe, that it may laugh with corn. Happy is the farmer, who, after removing the boulders, finds a soil capable under the most skillful and assiduous cultivation, of yielding more than the most ordinary competence for the education and comfort of his family. Unremitting work and economy are the Maine farmers' lot. If patient industry is to have its reward, I deem that man a philanthrophist, who shall make this life sweeter and more remunerative. I suspect if each one of you gentlemen should be pressed for a frank and candid answer, you would say: "I really think nature might have treated me a little better, so far as dollars and cents go."

Yet, what claim, I ask, has more industry for reward? That we may give an unprejudiced reply, let us take a distant illustration. High up on the sides of the Alps, upon little shelves of rock, apparently no larger than swallows' nests, the traveller sees the chalets of the Swiss peasants. By dint of hard labor he reaches the small patch of green, where one of these miserable hovels has been perched. Heavy stones rest upon the roof as if to anchor down what would be carried away by the terrible storms that sweep the mountain sides. Frequently they are without windows or fire, in the midst of winter. One room answers for the cattle and their keepers. And now, vanish Oh Poesie! The ruddy peasant of song and story is ragged and greasy, and his face is brutalized by overwork. The peasant girl, beautiful in anticipation, is a wrinkled crone, no better than her fellow, the fine texture of a woman has been ground out by hardship. "Their lot is worse than they deserve," says some one. "Are not the valleys fertile? If descending they find no foothold, is there not room enough in America? Why do they cling to the squalid home of unrequited labor? If they choose to stay they must be content with their reward. Their lack is a lack of intelligence; their toil has not received, for it has not deserved, remuneration."

Let this logic be applied to our unfortunate farmers. If the land is altogether infertile, if there is no soil to be developed, let it be known, for there are other lands that invite them. They deserve no sympathy for their unwarranted toil, they are fools for their pains. Many have accepted this logic. Nature says—"Remain in Maine and use your wits as well as your hands, or go West where the soil will do the thinking for you." Unwilling to undergo the rigorous training of the mind for scientific farming which alone is called for here, our young men have forsaken the homes of their fathers, and gone out by hundreds to the Western States.

It was my fortune the other day to ride through one of the oldest agricultural districts of our State. It is a rocky region, but it possesses valleys of natural fertility and well wooded slopes. Near sea and river, it is both beautiful and accessible. It invites occupancy and trade. Yet in spite of its natural advantages the blight seems to have fallen upon it. Its few habitations are rotting to the ground. On the one side and the other may be seen piles of bricks covered with brambles, and massive stone walls, indicating where once was thrift and industry. There was one flourishing feature—an abundance of grave-yards. A curious friend counted thirteen in a ride of eight miles. Every family seemed to have a private burying ground. There is a world of meaning in such cities of the dead. What was the result of the privation, the toil, the hard-fought lives of which these lichen-covered tombs are the only memorials? Their very names are forgotten, and their possessions are abandoned as not worth the inheritance. This is not a rare occurrence. The traveller journeying hither and thither through Maine, too often passes the moss-chocked orchard and half-filled well, significant tokens of an agricultural, and perhaps a life's failure.

What is the contest that has desolated our State, taking from it its young blood and sinew? It is but a peaceful rivalry of a surface of rock and sand, with a surface of fertile mould, yet our loss is greater than from the carnage of war.

Do you say that this is an exaggeration? that the number of farmers is greater to-day than it was ten years ago? True, for the census shows the number of farms to have actually increased from 55,698 in 1860, to 59,804 in 1870. Yet we must remember that many of the latter are occupied by newcomers who fill but numerically the places of their predecessors.

It is relatively that we have suffered loss. To illustrate,—who would infer from the census that a gigantic civil strife had lately taken from our midst a host of young braves? No more will it tell of the loss we have sustained in this peaceful contest of which I have spoken. It is only by computing the natural increase that we may infer our loss. During the ten years from 1860 to 1870 the increase of farms throughout the United States has been one-third. Instead of 59,000 there should be over 70,000 farms in Maine to-day.

To estimate the full measure of our loss we must inquire of Illinois, Iowa, Colorado—the great prairie and mining States, as to the antecedents of those who are leading their great enterprises, conducting their huge farms, building up this gigantic civilization. We shall find that a goodly proportion of them are sons of Maine. They will tell us that they have left home reluctantly, tearfully. The temptation—a solid yard of rich loam, they could not resist. They have left home, friends, kindred, and though their hearts may burn for the mountains and rivers of their boyhood, they will prefer probable affluence on a surface of muck to probable poverty on a surface of sand.

Now mark the result. If there were taken from us annually our criminals and good-for-nothings, such as foreign countries delight to send to our shores, we might consider it well. But our refugees from poverty are men of spirit and daring—a few hotspurs and dreamers, perhaps, but mostly of the class we can ill afford to lose. Historians depict in most glaring colors the terrible woes that have befallen France and Spain from the loss of the Huguenots. Similar evils are surely entailed upon our States by the exodus of her best sons. Numbers do not represent our loss, and it behooves every good and patriotic citizen to devise means for profitably occupying our young men. Our own welfare demands this, for we can retain them only by proving the profit and nobility of farming. Our most selfish and most worthy motives are at peace. Thus the presumption is formed that there is something lacking that must be supplied—something wrong that must be reformed. Let us then, as the physician would say, complete the diagnosis of the case. Having ascertained the difficulty let us inquire—"May science remedy it?" and if so, "How is science to be applied?"

What is the great allurement that calls our young men to the West? At the centennial exhibition you may have seen in high glass tubes, veritable sections of western prairie soils. To give their height, color, per centage in salts and vegetable matter, conveys no hint of its wonderful richness. To be appreciated it must be seen with the giant growth of corn upon it. Such a soil is better than mines of gold or rubies, and it is a part of our problem to show how it may be imitated if not quite equalled.

If by artificial means we may supply to our clay, gravel, sand, substances that will make the land as fertile as that in the tube, no one would wish to leave. With us, indispensable elements of plant food must be supplied which with them, are already in the soil. Here the streams coursing down the valleys year after year, have washed the earth's surface. This process of denudation has been carried on upon a still greater scale in times past. One who attentively observes the surfaces of the granite hills is sure to find grooves and scorings on the compact rock which have the direction always of north and south. Now, these indicate that in times before history began, a sheet of ice higher than the highest mountains covered the land. It swept slowly, remorselessly to the sea, carrying with it the soil and elements of fertility on the surface. If we could restore to it those treasures of which past times have robbed us, we would not acknowledge any land as our superior.

Let me premise, that I do not stand here to-night as a teacher of practical agriculture; I profess before you the deepest ignorance of your calling. Well I recollect the last agricultural attempts of my boyhood. A whole package of celery seed were planted in a frame a few feet square. Every seed seemed to sprout, and when it came time for weeding, I could not have done it with a microscope. I could not take a scythe in my hand to-day, without feeling that my toes were insecure, and I never engage in weeding without feeling a profound sympathy for a fossil-hunting friend, who sighs for a cast-iron back with a hinge to it. Nevertheless, as an unprejudiced looker-on, (deem it presumption, if you will) I shall tell you that many of your practices are entirely wrong. As a student of chemistry, and of those forces which underlie the growth of animals and plants, I know them to be wrong.

Science may in the first place teach the farmer to observe and experiment.

Science is not, as many imagine, a dry, musty collection of odds and ends of truth. It is much more a living method for discovering truth, which is as applicable to farming or theology, as to bugs or stones. The practical man and the philosopher, alike desire to get at the truth but for different ends.

How few men there are, who can make good use of their eyes. Untold treasures are trodden under foot, while the laborious seeker is fooled by pyrites. One will foretell you the weather from the cry of a bird, another forcasts the winter from the nest of the muskrat. Both prophets will fail ten times, yet distrust their senses rather than their delusion. Farmers discuss fertilizers, muck, fencing, breeds of domestic animals; all give close attention, make trials. Years roll by, and their opinions are more diverse than at the start; coincidence is mistaken for causation. This follows that, and the unsuspecting says it results from that.

A young man comes to me and would learn chemistry. He has read all about it, and would now practice it. I make him a few experiments, and he says to himself, "Is it so simple?" The materials are placed in his hands, and he is left to his own resources. Now, if that pupil comes to me after a time and confesses that he cannot trust his fingers or his eyes; that his knowledge is vain, then there is hope of his commencing at the bottom and working to the top of this science, like those who have made it. It is the merit of science, that it enforces this self-distrust upon all its faithful votaries. With them as with Socrates, knowledge consists in knowing that we know little.

This wholesome conviction guards from error, and the theories that have been unhesitatingly received by theologians and metaphysicians, have been held aloft, until their true character became known. Thus it is, that while religion has sects, philosophy schools, and almost every capital subject disputants, science is one, and its facts endure with the ages.

A cautious, systematic investigation of the mooted questions of agriculture, taking into consideration all the peculiar circumstances of the cases should put them beyond discussion. This has already been done with a number of them at the experimental stations of Europe. For working out these problems, there is necessary at the outset, an intelligent scepticism towards commonly received maxims, and the other disbelief in signs, superstitions and old wives' traditions.

In the second place, science will tell the farmer why a thing is to be done. There is too much farming done on the pinch to suit the taste principle of the kitchen. To know how to do a thing is most excellent, but it is vastly better to know why a thing is done. The first is like the action of a brute, mechanical instinctive; the second is an act of intellect, —human. Plodding labor is a most desirable quality; intelligent labor is unmeasurably superior.

It is true, bountiful crops, delicious fruits, and beautiful flowers may be raised by one who cannot tell how it is done, but such a one placed under different surroundings, on a new soil, in another climate, where the season is unusual, or the soil has become sterile, in the presence of a new seed or a devouring worm, knows not what to do. Like the beaver, which in a man's study, builds a dam of books and carpet against floods, which never come, his very instincts lead him astray.

Science gives the reasons for reasonable actions. It tells just why one fertilizer is used rather than another, the relation of preparing and planting the land, and its products. If you will intelligently tell a chemist the composition and structure of your soil and the situation of your farm, he should be able without experience to tell you what can be raised on it as it is, or what must be done to increase the yield, and this with perfect confidence and security.

It is not enough that man labors until his muscles yield from exhaustion, and then look to Providence for results. Nature has no pity for mistakes. She demands foresight.

3d. Science will enable the farmer to distinguish between good and bad advice. It was my pleasure, not long ago, to listen to some good, earnest advice to farmers, from the lips of an able and distinguished professor. He demonstrated that by the application to land of certain materials in certain proportions, abundant crops might be secured. His statements were verified by figures. Many practical farmers were present, and so far as I could learn, all were agreed that the facts stated were true, and the advice given was honest. Presently there appeared among the assembly of farmers, an agent for a fertilizer. This created suspicion, and the intimation was thrown out that he was an agent of the professor. I knew the latter to be an entirely honorable man, but the suspicion of the farmers once aroused, the good that might have resulted from the proposed plan, was in a great measure destroyed. We have no means of judging, but it is probable that but for this charge, hundreds of farmers would have improved upon the advice given them. But worthless fertilizers are urged upon the farmer, as well as valuable ones, and unless he possesses scientific knowledge, he cannot distinguish between good and bad articles, or good and bad advice.

4th. Science will show to the farmer the particular needs of animals and plants. With plants, an ignorance of the distinction of sex, frequently lies the cause of failure. I am familiar with a case where there was a large field of valuable plants which yielded neither flowers nor fruit, though every plant produced a good growth. One thing had been neglected: all the plants were of the same sex. A mere smattering of botanical knowledge would have saved the cultivator from failure.

5th. It will enable the farmer to select fertilizers and retain the fertility of the soil. To ascertain the needs of a plant is a simpler thing than to ascertain what our own body demands. The plant requires carbon, but the farmer does not need to supply it to the soil in the form of carbonic acid, it is abundantly present in the atmosphere. The plant needs oxygen, and finds it in air and water. The plant also needs nitrogen; that is contained in the air, but the plant will not touch nitrogen in its pure state. It must be supplied in combination with something else, or in the form of ammonia.

The plant must also have a supply of phosphate. This can be obtained solely from the excreta of animals or their bones. There was a time when the supply of phosphate proved inadequate for the increasing demand. A great cry was raised in the land for phosphate. Diligent search was made for it. Fortunately, in South Carolina an extensive deposit has been found containing the bones of huge animals that formerly haunted the sea where now is land. These fierce monsters have now become extinct, and better in death than in life, have left their bones for the benefit of agriculture. The enterprising English reaching the Orient, brings home ship loads of mummies for their phosphate. The bones of generals, priests and kings, who have retained their power and majesty long in death, are dragged from their resting places that vegetables, the food of late men, may fatten upon them. Thus has the world been ransacked to supply a want indicated but a short time since by the chemist, Liebig.

There is one other element, potash, in which the soil is frequently deficient. Without this substance, which can be seen in nearly a pure state in the leaching of wood ashes, no plant can grow. Potash was formerly obtained by burning plants, but recently inexhaustible deposits of potash salts have been discovered in Germany. It is brought largely to this country, and from this source potash may be cheaply supplied to soils that have lost their natural fertility.

In connection with the enumeration of the substances necessary to vegetation, it is of importance to observe that the distribution of them is no unimportant matter. If the soil contains everything else, yet lacks one of them, there can be no growth. Again, though all be present, yet there will still be no growth should one be in excess. Fertilizers are good, then, if they are needed; if already present they may poison the plant. The farmer must be able to give to his plants the food they need just as he gives to his domestic animals the food that is best adapted to promote their growth, to enable them to perform the labor he requires of them. For supplying the numerous needs of the crops, we find him depending almost upon the accumulation of barn-yard manure. Were there enough of this substance, it would indeed answer every purpose. Consisting originally for the most part of useless water, it loses so much of its important constituents by exposure, that if the substances the plant wants were to be taken out from a bushel of the costly manure, they would not fill a snuff box. Thus it is, that most farms are in a state of constant starvation. By experiments, properly conducted, these needs may readily be ascertained and supplied, and the waste of valuable elements of fertilization stopped.

Maine is the sixth State in the production of potatoes, and the eighth in the production of hay. She has, then, great advantages for the production of these two crops, and both of them are shipped in large quantities from the State. Now, how much value is thus taken away to other States? Every bushel of potatoes contains one-third of a pound, and every ton of hay contains 44 pounds of solid potash. Yet the farmer sends these away year after year and expects potash to be supplied. Where is the potash to come from? It was not originally in the soil, it was deposited there, and if he has taken it out he must put it back again. Some other substance will not answer. It is not silica the plant needs, it is potash. What a beautiful economy could be carried out on a farm if the knowledge of the composition of soils, and the proper application of manures, could be applied to the art of farming.

The farmers have a strong prejudice against concentrated fertilizers. It is not easy to bring the proofs to bear to dislodge this prejudice from the mind. It was a long while before science could bring people to believe that all the medicinal properties and virtues of a large quantity of Peruvian bark could be concentrated in a single pill. We are now going through a similar experience with fertilizers. We have been so long in the habit of fertilizing with a large quantity of material that we are slow to understand that we can accomplish the same results, more surely and more easily, by a small dose.

6th. Science may arm the farmer against his foes. Every now and then, there comes from some obscure quarter a devouring worm. It seems as if every beautiful or desirable thing that grows is an especial object of pursuit. Some of you can recollect, perhaps, when peaches were produced in Maine of considerable size. The peach, the plum and the currant have met with their foes. The apple is left, but I fear every day, something will come and take this, our last fruit. The scientist studies the habits of these pests, finds out what they eat, and when they are produced, and often he is able to inform the farmer that by planting a little earlier or a little later, certain worms may be avoided. There was a time when it appeared as though the silk industry in France would be destroyed. The silk-worms sickened and died. No farmer could tell what ailed them. They were just as well the night before, apparently, as the others. The population dependent on the silk industry was on the brink of famine. The French Government was at its wits end, but with the sagacity which it has always displayed in such emergencies, it selected one of the most expert scientists of the day to make microscopical investigation. He found that the blood of some of these insects was diseased. He devised means for destroying those that were so diseased, and, by the use of the microscope, for saving those that were well. The silk industry is now flourishing through that man's discoveries.

Farmers have frequently good intentions in regard to a difficulty, without such knowledge as will guarantee them success in their efforts to surmount it. Take the case of the wheat rust. The German peasants had been for a long time suspicious of the barberry bushes that were grown in hedges beside the railroads, until so great had come to be their hatred of them that they frequently assailed and destroyed them. As the hedges were extended the devastation of crops increased. The peasants did not know that there was any connection between the two; they had only a vague distrust of the barberry bushes. Now comes an obscure scientist and looks into the matter. He finds that the bushes are, at a certain stage of its development, essential to the growth of the rust. By his direction the bushes are cut down and the disease is removed. The farmers were right in their suspicion, but that did not help them. Science was called in, the bushes were cut down, and the rust disappeared as science said it would.

Scientific men have often entered upon a given investigation without hope of reward for the sake of information, but by the result of that investigation agriculture has been greatly benefitted. It is not the province of the scientist to help the farmer. His province as a teacher is an important one, but he has another that is still more important—to ascertain new facts. The farmer ought not to taunt science with—"Why do you not come to my aid?" That is not the office of science. The farmer ought to come forward, to invite science and give her a place on his farm.

7th. Could science be only rightly understood and appreciated on the farm, many new industries might be introduced into our State.

I had the honor not long since of calling the attention of the Board to the desirability of introducing on the continent a great industry—the manufacture of beet root sugar. Many individuals have asked me—"Can it be brought into the United States?" Millions of dollars worth of the sugar are made every year, and all of our Northern States are adapted to the culture of the beet. It can be grown economically. Why is it not done? Because there is no one to do it. No one farmer can do it successfully. It is an industry that must be conducted on scientific principles. What has it done in other countries? In France it has twice saved the State from bankruptcy. The experiments were first made by scientists. When it was laid down by one, it was taken up by others, until under circumstances that gave it a special importance, it was taken up by the Great Napoleon and has come to assume the place it now holds, as one of the greatest industries of the nation. Their is one point of view in which this industry is of importance to us. I have spoken of the need of potash in our agriculture. But there is no need of furnishing potash to the sugar beet. With its deep tap root the beet reaches a sub-soil untouched by other plants, and scarce indeed must be the potash if it finds none. The refuse material left after the sugar is extricated is excellent food for cattle. So you gain, not only in the production of sugar, but in the raising of cattle, and the enrichment of the soil.

There are a good many points that if I had time, properly to present them, would show how in different directions science could help the farmer. I should like to show, as I can only indicate, what the discussion of the theory of evolution has done for the farmer. There came up the question of how much an animal could be changed. It has been found that the nature and form of animals and plants are pliable, and if time is given you can mould them as you will. The other day I saw a machine into which you place the material, and out comes a box, with bottom, sides and cover, all complete; and another from which if you supply an iron rod, it comes out a box of tacks. In a certain sense, these machines think; the inventor has breathed into them of his spirit; he has substituted the indefatigable arms and fingers of steel for feeble flesh. Now nature is more intricate than any human contrivance, yet if man will but study and discern, he may fashion her products according to his desires. If you would have a cow with large bones and gaunt body able to run like a deer, you can have such a one, or if you would fashion her with graceful lines, well covered with flesh, and capable of producing a constant supply of rich, creamy milk, it can be accomplished. You may grow bristles on your sheep, or you may give its fleece the fine texture of cassimere. The flesh lies before us as the sculptors' marble, out of it may be wrought the ideal. If the result is wrong, it is because *man* has failed. If his processes are right, he may substitute for his laborious and inefficient efforts, the tireless and unfailing forces of nature.

I wish now simply to suggest one or two methods, by which these possibilities may be realized. In the first place, our young people, and especially the sons of farmers, must be taught science.

But teachers say, "We hav'nt time or place for scientific study in our schools." If there is a demand for it these will be found. Indeed, natural science may be so presented, as to economize time. Natural science begets an interest in the teachings of the school, and a willing mind like a willing hand does double work. I believe that teachers may be found who have a fitness for giving such instruction, and for the services of such we should be willing to pay liberally. Your boys and girls have the same faculties as young men; they are often better observers, and they can study science with profit. It may be presented to them in its most attractive form, before they are fitted to study it from books. So unnatural and repulsive has our common system of education been made that it has been well said, that there was but one more feature needed for the protection of ideas in our public schools, and that was a police officer to make the children go.

There should be no delay in substituting for Algebra and other obstruse studies, the elements of the natural and physical sciences. The former can render the every-day citizen but slight services, while the latter opens up a new sphere of observation. Observation begets investigation, and the latter would be especially profitable to the farmer.

Much may be learned from our common schools. We Americans call ourselves practical, yet when we do come at a practical point in inventing or in using a thing, we find that some German chemist or philosopher is at the bottom of it; he has made investigations, but for which it could not have been.

A study of nature commenced in infancy cannot but have had an important influence in determining the scholars and savans, who have made Germany the centre of critical research. How may science be brought to the farmer, who has not his youth before him? The holding of scientific fairs, and a thorough geological survey of our State, are means that might be advantageously employed. The operations of educating young men in practical agriculture, is another way that would assist in making science practical. It is to be hoped that a larger proportion than heretofore, of the graduates of our State College at Orono, instead of becoming professional men and civil engineers, will turn their efforts in this direction. I think that the proportion has been but about one in ten. If so, it has cost the State some $10,000 to get an educated farmer. Such an education involves an unequel tax on the people. It seems to the speaker, to be a matter worthy of discussion, whether it might not be better to make agricultural institutions chiefly model farms, where farmers young and old may have the benefit of an inspection of scientific methods, and carefully conducted experiments. We ask too much of our friends, when we expect them to do the work of a college and of an experimental station. I know they are capable men, but they are poorly paid, scantily supplied with books and apparatus, and over-taxed with routine instruction. It seems to me it might be desirable, if we could make a division, and could have men who should give their whole attention to practical agriculture; or if we could have agricultural experts employed by this Board, who should go among the farmers and teach them the principles of the sciences, which bear directly upon their profession.

And thus, gentlemen, I have stated the alliance between science and farming, which I deem essential to the future progress of agriculture in Maine. Hitherto this alliance has not been so close as that between science and the other great industries. As a consequence, agriculture is not held to be so honorable as of old. It must be again brought into association with literature and art. The agency by which this may be accomplished, is trained intelligent labor. Such labor creates independence. I would insist that you have money:

> "Not for to hide it in a hedge,
> Nor for a train defendent;
> But for the glorious privilege
> Of being independent;"

so that you may employ it for good purposes. I would have you labor with the security of attaining a desired end; I would have you increase your crops by the use of the implements and devices which science and reason bring within your reach. When you have done these things, then will it have become possible to build on this lower stratum the higher possibilities of the human being. Those possibilities are what ennoble a calling, If I did not believe that they might be; if I did not believe that they would be realized, I could not stand here and ask you to conform your practice to the principles of science. Guided by right principles, an advance in one direction is an advance in all. By material prosperity, intellectual power and moral susceptibility are enhanced.

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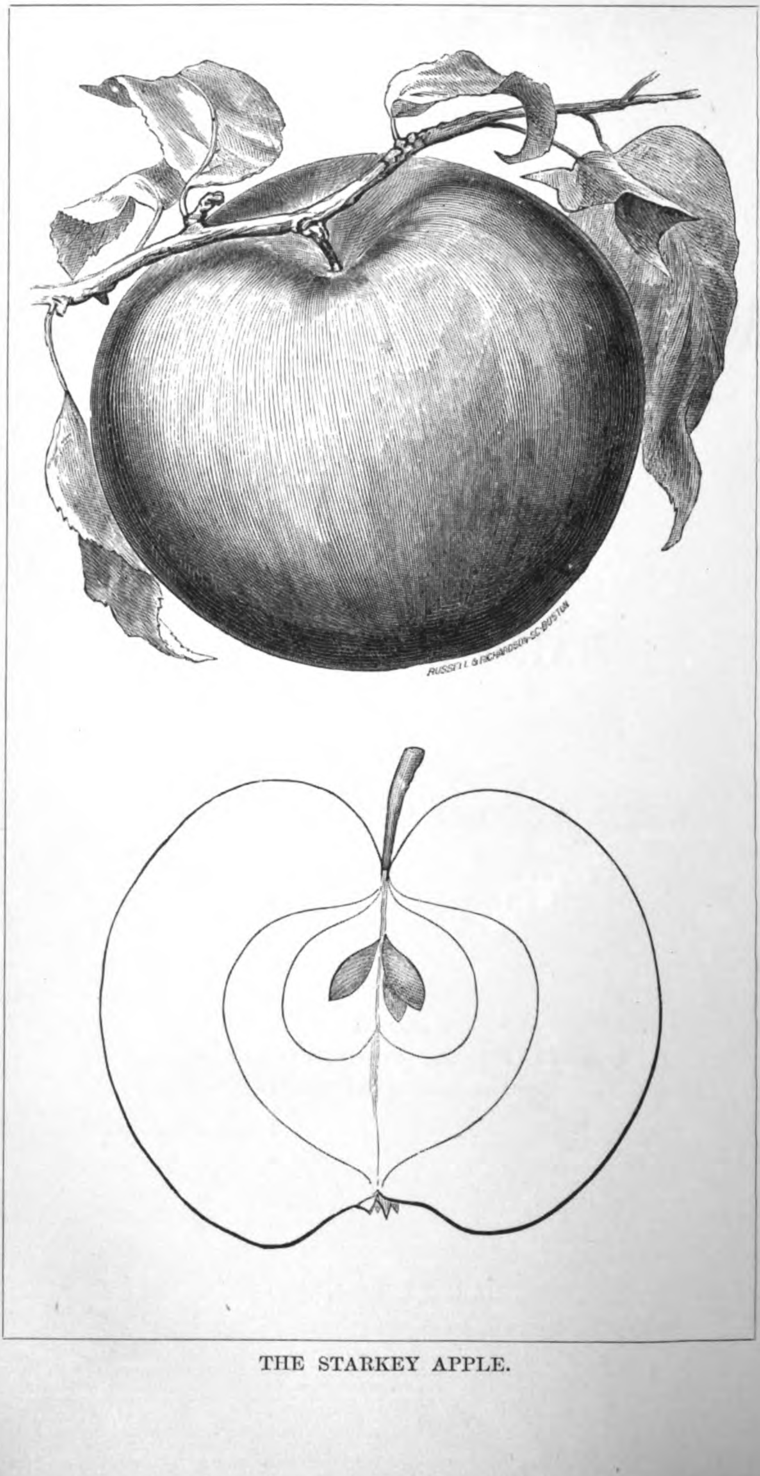

THE STARKEY APPLE.

ANNUAL REPORTS

OF THE

AGRICULTURAL SOCIETIES

OF

MAINE FOR 1877-8;

WITH ACCOMPANYING PAPERS.

EDITED BY
SAMUEL L. BOARDMAN,
SECRETARY OF BOARD OF AGRICULTURE.

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Maine State Pomological Society.

TRANSACTIONS FOR 1877.

The Secretary of the Maine State Pomological Society herewith presents his report of the Transactions of the Society for the year 1877.

This Society was incorporated and organized in the winter of 1873, and has held five annual exhibitions, and the same number of Winter Meetings,—so located as to make the benefits to be derived from them, as far as possible, available to all the people of the State; and in these efforts it has received a considerable degree of encouragement,—as much perhaps as it has deserved, but not as much as the importance of its work demands.

It has published four annual reports of its Transactions, (prior to this one) which have been received with much favor both at home and abroad. These reports, averaging 153 pages each, embrace a vast amount of information indispensable to every fruit grower, horticulturist and florist in Maine, and of interest to every citizen of the State,—in the form of practical papers, by our best cultivators, on all subjects relating to fruit growing, reports on subjects of special interest, results of experiments, lists of varieties for different purposes, recommended or otherwise, descriptive lists of fruits, etc.

It is presumed that the general purposes of the Society, as indicated by its name, and epitomized in the charter in the words "the promotion of fruit-culture," and the established methods by which it seeks to accomplish these purposes are so well understood as to need no more particular statement at this time.

THE WORK OF THE SOCIETY

During the past year, beginning at the close of the Winter Meeting of 1877, and ending with that of 1878, has followed in the same general methods as in previous years, and while seeking as far as possible to avoid falling into a mere lifeless routine, by the adoption or trial of every improvement suggested by observation or experience, we have found much in the details of the work that could not be changed for the better.

It cannot be expected that an organization composed of persons engaged in the various avocations of active life, and but few of them able to make Pomology a leading pursuit, can present themselves before the public year after year without saying much that will appear repetitious. Hence it is, that, saying nothing of the material prosperity of the Society, we need a constant accession of new members. On the other hand, it may be said that the principles which lie at the foundation of successful fruit culture in this State, are of such vital importance that they cannot be too often repeated or too constantly kept in mind.

Aside from the annual exhibition and winter meeting, the details of which will be given in subsequent pages, the most important undertaking of the year has been that of collecting and publishing full and accurate statistics of the nursery business of the State, embracing the number, kinds, age, condition and location of fruit trees *grown in the State* for sale. The Society has from the first taken a decided stand in favor of the home production of trees to supply the wants of the people of the State,—not only to secure stock better adapted to our soil and climate, and more generally of suitable varieties, but also to stop the enormous drain of money, amounting to many thousands of dollars annually, sent out of the State for the purchase of all sorts of trees known and unknown; and it will be remembered that at the first Winter Meeting (1874), the subject was fully considered and discussed by the best orchardists of the State, and a resolution was adpoted "that Maine can and ought to grow her own fruit trees." This principle has been adhered to ever since, and repeated and enforced on every proper occasion. The State Board of Agriculture, also, opportunely coming to our aid, and acting under the authority vested in it by the statute law, some three years ago directed that the several county agricultural societies receiving bounty from the State, should offer certain specified premiums for the planting of new orchards and the growing of native nursery stock. No special report of the operations of the county societies under these instructions has been made other than appears in their yearly doings in the report of the Board. This Society therefore thought it proper to undertake a *census of the nursery business*, which it was known had attained considerable proportions. Accordingly circulars were issued and notices given through the newpapers, calling for the information desired; and the President of the Society undertook the task of collating and verifying the statistics by personal correspondence and observation. The result will appear in his special report at the Winter Meeting, and though far from being complete, are sufficient to indicate that the business is no longer an experiment with respect to its *practicability.* They also show that there are trees enough grown in the State and now ready for market, to supply our immediate wants, and more than will, as a matter of fact, in any given year, with our present degree of pomological knowledge be judiciously planted and taken care of. The publication of these statistics, though not intended in any sense as an advertisement of the parties named, will, if it should inure to their benefit, be no more than a just reward for their enterprise and skill.

The library of the Society has received considerable additions by means of the exchange of publications with other societies, which will together with the correspondence of the Secretary, be made the subject of a special report hereafter.

At the last Winter Meeting arrangements were made to obtain more full information in respect to the business of fruit growing in the several counties, and to bring the Society into more immediate contact with the people throughout the State, by the appointment of county committees to act in conjunction with the several Trustees for that purpose.

A committee on entomology was also appointed, composed of gentlemen of great scientific attainments, from whom it is expected valuable reports will be hereafter presented, as a subject of the utmost importance in fruit growing.

No opportunity has presented itself during the year for a revision of the Society's fruit lists, but errors and imperfections have been noted when discovered, and a thorough revision will doubtless be made during the ensuing year.

For a record of the season of 1877 in respect to fruit growing, the obstacles met with and the degree of success attending the business, reference is made to the local reports subsequently given and notes accompanying the same; and for the financial reports, list of members and other matters of special interest to the members, to the appendix to this report.

THE FIFTH ANNUAL EXHIBITON

of the Society was held at Waterville, Kennebec county, September 25th–28th, 1877. There was some reason to believe that the partial failure (in a financial point of view) of our exhibition there the previous year was due solely to temporary and accidental causes, and that a second attempt in the same place, with a better acquaintance and a better understanding of our objects on the part of the local population, would result more favorably. Accordingly, the most ample preparations were made to insure success, and no effort was spared to make the exhibition attractive as well as instructive; it was thoroughly and seasonably advertised, and the railroads granted the usual liberal reduction of fares. The premium list was carefully revised, and the amount of premiums increased to $1,111.00 besides $40.00 offered in special premiums for cut flowers, &c., by James Vick of Rochester, N. Y. The arrangements made involved a larger expenditure than ever before, but as on former occasions failed to bring out a correspondingly large attendance.

The exhibition was among the most complete, in the aggregate of the several departments represented, ever held in the State; fully occupying the main floor and a portion of the galleries of the town hall, besides the smaller hall in the basement; while that of the previous year was embraced in the floor of the main hall.

By the list of entries given below it will be seen that the exhibition was confined almost exclusively to fruits, vegetables and flowers, although there was a considerable display of horticultural appliances, ornamental work and miscellaneous articles, and the hall was further adorned with floral designs, pictures and other works of art. The display of apples, pears and grapes was especially fine, embracing many new varieties and but few inferior specimens, and reflected great credit upon the veteran exhibitors who have built up the reputation of the society in these departments, as well as upon the new exhibitors who appeared this year for the first time. Plums were not exhibited to any noticeable extent, owing to the lateness of the exhibition. Vegetables and garden crops were well represented and the specimens were of great excellence. Cut flowers, bouquets, wreaths, designs and pot plants were presented in great abundance and fine condition, and there were extensive displays of green-house plants and ferns.

The rules governing the exhibition having been considerably modified since their last publication in an annual report, are here presented in full.

1. Entries may be made at the office of the Secretary, in Wiscasset, personally, or by letter, until September 20th; and after that at the Hall, on the first day of the exhibition until 4 o'clock P. M.

2. Exhibitors are requested to present full and accurate lists of the varieties of fruits or other articles to be entered; and to specify the premium for which each article is entered; also to affix their full Christian names and P. O. address, so that the same may be correctly transferred to the books and exhibition cards.

☞ Persons intending to make any considerable number of entries will confer a special favor by sending lists of the same to the Secretary at an early day.

3. All fruits and flowers offered for premiums (except No. 1) must have been grown by the exhibitor; and any violation of this rule will debar or forfeit the premium. Specimens offered for *exhibition only*, by others than the growers, must in all cases have the name of the grower affixed, if known.

4. All fruits and flowers exhibited must, as far as possible, be correctly named according to the standard nomenclature adopted by the Society, and it will be the duty of the standing committees of the Society to examine labels and correct all errors in nomenclature during the exhibition.

5. All fruits offered for premiums must be composed of exactly the number of specimens, or quantity, named in the schedule.

6. Dishes and labels for exhibition of fruits, and phials and stands for cut flowers, will be furnished by the Society, and no others will be admissible.

7. Exhibitors must see to the delivery of their contributions and will be required to put them *in the places designated for them.* After the articles are arranged, they will be under the exclusive charge of the Society, and the owners will not have the liberty to remove them until the exhibition is closed. Every precaution will be taken for the safe keeping of articles on exhibition, after their arrival and arrangement upon the tables; but the Society will not be responsible for any loss or damage that may occur.

8. No premium will be awarded merely for want of competition, nor unless the article exhibited is worthy of it; and the Committees are authorized to withhold the first and award the second or any subsequent premium, or none, at their discretion, according to merit. They are also to withhold all premiums from any article not exhibited according to the rules, or where any unfair practice has been attempted by the exhibitor.

9. The Committees are authorized to recommend gratuities for any new or rare fruits, flowers, plants, vegetables or articles of merit for which no premiums have been offered.

10. When a specimen is presented for a name, the exhibitor shall communicate all the information he possesses as to the origin and the local appellation.

11. No member of any of the Committees for awarding premiums shall in any case, vote or decide respecting an award for which such member may be a competitor, or therein have an interest; but in such case such member shall temporarily vacate his place upon the Committee.

12. All premiums awarded will be payable by the Treasurer in thirty days after the close of the exhibition, provided that all premiums awarded will be liable to a *pro rata* reduction sufficient to meet any deficiency that may occur in the receipts, to meet said premiums and other expenses; and those not applied for before the first day of January next shall revert to the Society.

13. The Society's premiums are open for competition to all persons residing in the State; but when premiums less than $20.00 are awarded to a person not a member of the Society, the fee for membership will be

deducted therefrom; and when premiums amounting to $20.00 or more are awarded to any person not a life member of the Society, the fee for life membership will be deducted therefrom; and in either case certificates of membership will be issued.

THE DETAILS OF THE EXHIBITION

will more fully appear in the statement below, giving the premiums offered, the conditions affixed, the entries, and the premiums awarded.

[NOTE—The names of persons to whom premiums were awarded are given first under each specification, with the amount awarded, and afterwards the names of other competitors for the same. When the name of a person is repeated the place of residence is omitted.]

CLASS 1.—*Apples.*

FIRST DIVISION.

Conditions—"Entries for all premiums in this division must consist of five specimens of each variety exhibited, and (except Nos. 19 and 20) of at least twenty named varieties. Entries for premiums Nos. 1, 19 and 20 must be separate and distinct collections, not embracing any other collection or specimens.

Collections entered for premiums Nos. 2 to 17, may also be entered for No. 18, but in any such case only one premium will be awarded for one collection."

No. 1. For the best general collection of apples grown exclusively within the limits of either county in this State, but not necessarily grown by the exhibitor.

S. R. Sweetzer, Cumberland Centre, (Cumberland County) first premium, $20; W. S. Place, Charleston, and John L. Leighton, Dexter, (Penobscot County,) second premium, $15; Daniel Ayer, No. Vassalboro', (Kennebec County), third premium, $10.

2. For the best general exhibition of apples, grown by the exhibitor, in Androscoggin County, Francis Cary, Turner, $10.

3. For the same in Aroostook County. (No entry.)

4. For the same in Cumberland County. Henry M. Chase, No. Yarmouth, $10.00; Milton Dyer, Cape Elizabeth.

5. For the same in Franklin County. (No entry.)

6. For the same in Hancock County. (No entry.)

7. For the same in Kennebec County. Robert H. Gardiner, Gardiner, $10; Alfred Smith, Monmouth; Joseph Taylor, Belgrade.

8. For the same in Knox County. (No entry.)

9. For the same in Lincoln County. Henry Ingalls, Wiscasset, $10.

10. For the same in Oxford County. (No entry.)

11. For the same in Penobscot County. S. C. Harlow, Bangor. (Premium not awarded because the same collection took the first premium under No. 18.)

12. For the same in Piscataquis County. (No entry.)

13. For the same in Sagadahoc County. (Not entry.)

14. For the same in Somerset County. James S. Hoxie, Fairfield, $10; Frank E. Nowell, Fairfield.

15. For the same in Waldo County. Mrs. A. B. Strattard, Monroe; J. W. Lang, Brooks. (Did not conform to the rules.)

16. For the same in Washington County. (No entry.)

17. For the same in York County. John Hanscom, Biddeford, $10.

18. For the best general exhibition of apples. S. C. Harlow, $20; Joseph Taylor, $15; Alfred Smith, $10; Henry M. Chase, $5; Henry Ingalls; Francis Cary, Turner; Robert H. Gardiner, John Hanscom, James S. Hoxie, Milton Dyer, Mrs. A. B. Strattard, J. W. Lang.

19. For the best five named varieties of fall apples. Geo. B. Sawyer, Wiscasset, $5; J. Pope and Son, Manchester, $3; S. C. Harlow, $2; Alfred Smith, Joseph Taylor, Robert H. Gardiner.

20. For the best five named varieties of winter apples. J. Pope & Son, $5; Alfred Smith, 3; Milton Dyer, 2; Joseph Taylor, Henry Ingalls, Geo. B. Sawyer, Robert H. Gardiner, S. C. Harlow.

SECOND DIVISION.

"Entries for premiums in this division must consist of *ten* specimens of each variety exhibited, and must be separate specimens from any exhibited in the first division."

21. For the best single variety of autumn apples. G. B. Sawyer, $3, (Porter); C. H. Bradford, Turner, $2, (Gloria Mundi); Alfred Smith, (Porter); Joseph Taylor, (Judy); J. Pope & Son, (Pomme Royal).

22. For the best single variety of winter apples. S. C. Harlow, $3, (R. I. Greening); R. H. Gardiner, $2, (Yel-

low Bellflower); Alfred Smith, (Roxbury Russet); Joseph Taylor, (Northern Spy); Arnold Greenleaf, Wiscasset, (Northern Spy); W. S. Place, (Rolfe).

23. For the best dish of American Golden Russets. Henry Ingalls, $2; G. B. Sawyer, $1; Daniel Ayer.

24. Baldwins. Pulsifer Bros., East Poland, $2; Joseph Smiley, Vassalboro', $1; Alfred Smith, Joseph Taylor, G. B. Sawyer, Henry M. Chase; E. K. Whitney, Harrison; John Hanscom, Arthur H. Taber, Daniel Ayer; Z. A. Gilbert, East Turner; Milton Dyer, Henry Ingalls, J. Pope & Son, S. R. Sweetzer; J. Colby Dudley, Readfield.

25. Black Oxfords. Pulsifer Bros., $2; Z. A. Gilbert, $1; Henry M. Chase.

26. Dean. John L. Leighton, $2; J. Pope & Son, $1.

27. Duchess of Oldenburgh. Henry Tilley, Castle Hill, $2; S. R. Sweetzer, $1; S. C. Harlow.

28. Early Harvest. Pulsifer Bros., $1.

29. Fall Harvey. John L. Leighton, $2; Alfred Smith, $1.

30. Fameuse. Edward H. Cook, Vassalboro', $2; Arnold Greenleaf, $1; Alfred Smith, G. B. Sawyer, Henry Tilley.

31. Gravenstein. E. K. Whitney, $2; S. C. Harlow, $1; Alfred Smith, Henry Ingalls.

32. Hubbardston Nonsuch. Pulsifer Bros., $2; Alfred Smith, $1; Joseph Taylor, Arnold Greenleaf, Henry M. Chase, R. H. Gardiner, J. Colby Dudley, Arthur H. Taber; Calvin Spaulding, Hallowell; Z. A. Gilbert.

33. Hurlbut. Edward H. Cook, $2; Arthur H. Taber, $1; Daniel Ayer.

34. Jewett's Fine Red. Pulsifer Bros., $2. Alfred Smith, $1; Joseph Taylor, Henry M. Chase, Z. A. Gilbert.

35. King of Tompkins County. S. C. Harlow, $2; Henry Ingalls, $1; Daniel Ayer.

36. King Sweeting. (Not awarded.) Alfred Smith.

37. Minister. J. Pope & Son, $2; John L. Leighton, $1.

38. Mother. Henry Ingalls, $2; J. Pope & Son, $1; Henry M. Chase.

39. Northern Spy. Henry Ingalls, $2; Joseph Taylor, $1; R. H. Gardiner, John L. Leighton; F. W. Runnels, Clinton; Pulsifer Bros., S. R. Sweetzer, S. C. Harlow; Mrs. F. A. Jones, Waterville.

40. Porter. Alfred Smith, $2; Henry Ingalls, $1; Arnold Greenleaf, Francis Cary, Henry M. Chase, E. K. Whitney, Milton Dyer.

41. Primate. (No entry.)

42. Pumpkin Sweet. (Not awarded.) Henry M. Chase, F. W. Runnels.

43. Red Astrachan. (Not awarded.) G. B. Sawyer.

44. Red Canada. Pulsifer Bros., $2; Alfred Smith.

45. Rhode Island Greening. S. R. Sweetzer, $2; Joseph Smiley, $1; Joseph Taylor, G. B. Sawyer, Henry M. Chase, J. Colby Dudley, Daniel Ayer.

46. Roxbury Russet. Pulsifer Bros., 2; Alfred Smith, $1; Joseph Taylor, J. Colby Dudley, E. K. Whitney, Z. A. Gilbert, S. R. Sweetzer.

47. Sops of Wine. S. C. Harlow, 2; Alfred Smith.

48. Somerset. W. S. Place, $2.

49. Starkey. Daniel Ayer, $2; Arthur H. Taber, $1; Edward H. Cook.

50. Tallman's Sweet. Joseph Smiley, $2; F. W. Runnels, $1; F. E. Nowell, Pulsifer Bros.; John Reynolds, Jr., Clinton; Arthur H. Taber, Daniel Ayer, Z. A. Gilbert, J. Pope & Son, S. R. Sweetzer, S. C. Harlow, Mrs. F. A. Jones.

51. Tetofsky. (No entry.)

52. Wagener. Daniel Ayer, $2; Henry Ingalls, $1.

53. William's Favorite. S. C. Harlow, $2.

54. Winthrop Greening. F. E. Nowell, 2; Calvin Spaulding, $1; Alfred Smith, Geo. B. Sawyer.

55. Yellow Bellflower. R. H. Gardiner, $2; Arthur H. Taber, $1; Joseph Taylor, F. W. Runnels, Calvin Spaulding.

56. Seedling Apples. Alfred Smith, Joseph Taylor, Henry M. Chase, John Reynolds, Jr., (two varieties); John Emerson, (two varieties); D. E. Manter, Sidney, (two varieties); Milton Dyer, (two varieties); S. R. Sweetzer.

57. Crab apples. J. A. Varney & Son, No. Vassalboro', $1; Alfred Smith, G. B. Sawyer, John L. Leighton; Mrs. Peter De Rocher, Waterville; F. E. Nowell, John Emerson, (two varieties); Mrs. Moses Getchell, Winslow; Milton Dyer, S. R. Sweetzer.

58. Collection of crab apples (not less than five varieties.) G. B. Sawyer, $3; Alfred Smith, John Emerson.

Sundries. The following varieties not named in the premium list were exhibited, viz: By F. W. Runnells, Pound Sweet and Fall Pippin; G. B. Sawyer, Newtown Pippin, American Golden Pippin and Peck's Pleasant; Pulsifer Bros., Gloria Mundi of Androscoggin County, Spitzenburg and Noyes apple; E. K. Whitney, Blue Pearmain, Spitzenburg, Bloomfield and Garden Royal; John Hanscom, Bottle Greening; Z. A. Gilbert, Gilliflower; Henry McLaughlin, Loudon

Pippin, Northern Sweet and Hawley; Ansel T. Mores of Ashland, collection of apples, varieties not named. Mr. S. B. Hobson of Mt. Pleasant, Neb., exhibited specimens of apples grown in 1876 and preserved by patented process. There were some other specimens and collections brought in too late for entry.

CLASS 2.—*Pears.*

Entries for premiums Nos. 59, 60 and 61 were required to consist of *five* specimens of each variety exhibited, and for Nos. 62 to 90, inclusive, of ten specimens of each variety.

59. For the best general exhibition of pears. Samuel Rolfe, Portland, $15; Henry Ingalls, $12; Alfred Smith, $8; Joseph Taylor, $5; Calvin Spaulding.

60. For the best five named varieties of autumn pears. S. S. Low, Bangor, $5; Alfred Smith, $3; Joseph Taylor, G. B. Sawyer, Calvin Spaulding.

61. For the best five named varieties of winter pears. (No entry.)

62. For the best single variety of fall pears. Joseph Taylor, $3, (Bartlett); Alfred Smith, $2, (Maria Louise); E. K. Whitney, (Flemish Beauty); Calvin Spaulding, (Goodale).

63. For the best single variety of winter pears. Geo. B. Sawyer, $3, (Lawrence); Alfred Smith, $2, (Glout Morceau); Joseph Taylor, (Lawrence).

64. For the best dish of Bartlett pears. Joseph Taylor, $2; Granville Fernald, Harrison, $1; Henry Ingalls, S. S. Low.

65. Belle Lucrative. Henry Ingalls, $2; Alfred Smith, $1; Henry McLaughlin.

66. Beurre d'Anjou. Henry Ingalls, $2; Alfred Smith, $1.

67. Beurre Bosc. (None exhibited.)

68. Beurre Hardy. Henry Ingalls, $2; Henry McLaughlin, $1; R. H. Gardiner.

69. Beurre Superfin. Henry Ingalls, $2; Joseph Taylor.

70. Beurre Clairgeau. Calvin Spaulding, $2; G. B. Sawyer, $1; Henry Ingalls.

71. Beurre Diel. Alfred Smith, $2; S. S. Low, $1; G. B. Sawyer.

72. Buffum. Alfred Smith, $2; E. K. Whitney, $1; Joseph Taylor, R. H. Gardiner, Calvin Spaulding.

73. Clapp's Favorite. S. S. Low.

74. Doyenne Boussock. Henry Ingalls, $2.

75. Duchess d' Angouleme. Mrs. K. B. Laselle, Waterville, $2; Samuel H. Dawes, Harrison, $1; Alfred Smith, Joseph Taylor, G. B. Sawyer, S. S. Low, Henry McLaughlin.

76. Flemish Beauty. John L. Leighton, $2; S. R. Sweetzer, $1; Alfred Smith, Joseph Taylor, R. H. Gardiner, S. S. Low, Granville Fernald, Hiram Cornforth, W. Waterville; Henry McLaughlin, S. C. Harlow, Arthur H. Taber.

77. Fulton. E. K. Whitney.

78. Glout Morceau. Alfred Smith, $2; Henry McLaughlin, $1; R. H. Gardiner.

79. Goodale. Calvin Spaulding, $2; Henry Ingalls, $1; Joseph Taylor, E. K. Whitney.

80. Howell. (No entry.)

81. Lawrence. G. B. Sawyer, $2; Joseph Taylor, $1; E. K. Whitney.

82. Louise Bonne de Jersey. E. K. Whitney, $2; Henry Ingalls, $1; Alfred Smith.

83. Maria Louise. Alfred Smith, $2.

84. Seckel. (No entry.)

85. Sheldon. Joseph Taylor.

86. Swan's Orange. Henry Ingalls, $2.

87. Urbaniste. Joseph Taylor, $2.

88. Vicar of Winkfield. Alfred Smith, $2; J. Colby Dudley.

89. Winter Nelis. Henry McLaughlin, $2; R. H. Gardiner.

90. Seedling pears. (No entry.)

Gratuity. R. H. Gardiner, Napoleon, .50.

Henry McLaughlin exhibited specimens of Beurre de Brignais, Beurre d' Aremberg and Indian Queen; S. C. Harlow, specimens of pears named Harlow.

The specimens of Flemish Beauty exhibited were especially excellent, and coming from various parts of the State would seem to indicate that this old and favorite variety has taken a new lease of life.

CLASS 3.—*Grapes.*

91. For the best exhibition of foreign grapes, grown with fire heat. (No entry.)

92. For the best exhibition of foreign grapes, grown in cold grapery. Andrew S. Sawyer, Cape Elizabeth, $10; G. B. Sawyer, $8; Henry Ingalls, $5.

93. For the best cluster of Black Hamburg. G. B. Sawyer, $2; Andrew S. Sawyer, Henry Ingalls; John Burr, Freeport.

94. Wilmot's Hamburg. Andrew S. Sawyer, $2.

95. Victoria Humburg. Andrew S. Sawyer, $2.

96. White Frontignan. (No entry.)

97. Grizzly Frontignan. (No entry.)

98. White Muscat. G. B. Sawyer, $2; S. S. Low.

99. White Chasselas. S. S. Low, $2; G. B. Sawyer.

100. Lady Downes. (No entry.)

101. Buchland Sweetwater. Henry Ingalls, $2.

102. Trentham Black. Henry Ingalls, $2; G. B. Sawyer, Andrew S. Sawyer.

103. West's St. Peters. Andrew S. Sawyer, $2.

104. White Nice. (No entry.)

105. Red Chasselas. Andrew S. Sawyer, $2; Henry Ingalls, Geo. B. Sawyer.

106. Chasselas Musque. G. B. Sawyer, $2.

107. For the best collection of native grapes, (open air). G. B. Sawyer, $10; J. A. Varney & Son, No. Vassalboro', $8; Galen Hoxie, North Fairfield, $5; Peter De Rocher, Waterville, $3; Alfred Smith, Joseph Taylor, Charles I. Percy, Vassalboro'; J. C. Dudley, Calvin Spaulding, Mrs. A. B. Strattard, S. C. Harlow, Henry Ingalls.

108. For the best single variety, open air, three bunches. (Not awarded.) Joseph Taylor, G. B. Sawyer, Peter De Rocher, J. C. Dudley, Henry McLaughlin, J. A. Varney & Son.

109. For the best three bunches Delaware. Granville Fernald, $1; Geo. B. Sawyer, Andrew S. Sawyer, Charles I. Perley, Mrs. Peter De Rocher, E. K. Whitney, Alfred Smith, Galen Hoxie, Mrs. K. B. Laselle, Mrs. F. A. Jones, Calvin Spaulding, Henry McLaughlin.

110. Concord. Galen Hoxie, $1; Joseph Taylor, Geo. B. Sawyer, Andrew S. Sawyer, Mrs. P. De Rocher, J. C. Dudley, Alfred Smith; George Ballentine, Waterville; Calvin Spaulding, J. A. Varney & Son.

111. Hartford Prolific. Galen Hoxie, $1; Geo. B. Sawyer, Andrew S. Sawyer, Mrs. P. De Rocher, J. C. Dudley, E. K. Whitney, Alfred Smith; J. M. Taylor, Vassalboro'; Mrs. F. A. Jones, Waterville; Calvin Spaulding, J. A. Varney & Son.

112. Rebecca. E. K. Whitney, $1; Andrew S. Sawyer.

113. Allen's Hybrid. Henry McLaughlin, $1; G. B. Sawyer, J. C. Dudley, Alfred Smith.

114. Adirondack. J. A. Varney & Son, $1; Alfred Smith.

115. Black Hawk. J. A. Varney & Son, $1.

116. Creveling. Alfred Smith, $1; Charles I. Perley, Calvin Spaulding.

117. Massasoit. (No entry.)

118. Wilder. Geo. B. Sawyer, $1; Calvin Spaulding.

119. Lindley. G. B. Sawyer, $1.

120. Agawam. G. B. Sawyer, $1; Henry Ingalls, Charles I. Perley, E. K. Whitney, C. Spaulding.

121. Merrimac. Granville Fernald, $1; G. B. Sawyer, Calvin Spaulding.

122. Salem. Granville Fernald, $1; G. B. Sawyer, Mrs. Peter De Rocher, J. A. Varney & Son.

123. Worden's Seedling. (No entry.)

Henry Ingalls exhibited specimens of Cornucopia and Israella; G. B. Sawyer, Iona and Diana, grown under glass; A. S. Sawyer, Frankenthal and Iona; Charles I. Perley, Northern Muscadine and Isabella; J. C. Dudley, a seedling of Concord, Ives' Seedling and Dracut Amber; Granville Fernald, Blood's Seedling and Perkins; Galen Hoxie, Northern Muscadine; James Drummond, Waterville, Union Village; George Ballentine, Northern Muscadine; H. McLaughlin, Israella; J. A. Varney & Son, Rogers' No. 5, Diana, Isabella, Martha and Eumelan; J. M. Cobb, Yarmouth, Champion; and there were several varieties not named.

CLASS 4—*Plums and Miscellaneous Articles.*

124. For the best general exhibition of plums, not less than six varieties. (No entry.)

125. For the best dish of plums of a single variety. (Premiums not awarded.) Joseph Taylor, gratuity, $1.

126–145 inclusive. For single varieties of plums, peaches, apricots and nectarines. (No entries.)

146. For the best dish of quinces. E. K. Whitney, $2; Hiram Cornforth.

147. Ornamental dish of fruit. Mrs. George B. Sawyer, $3; S. C. Harlow, $2; Joseph Taylor.

148. For the best peck of cultivated cranberries. E. K. Whitney, $3; Mrs. A. B. Strattard.

149–151 inclusive. For orange, lemon and fig trees, in fruit. No entries.

152. For the best exhibition of canned fruit, not less than five varieties, of domestic manufacture. Mrs. E. B. Merrill, Vassalboro', $3; Mrs. Daniel Ayer, North Vassalboro', $2; Mrs. P. DeRocher, Joseph Taylor.

153. For the best exhibition of fruit jellies, not less than five varieties, of domestic manufacture. Mrs. H. P. Pearson, Vassalboro', $2.

154. For the best exhibition of pickles, domestic manufacture. Mrs. P. De Rocher, $2; Mrs. W. E. Drummond, Winslow.

155. For the best exhibition of terra cotta ware made in this State. Portland Stone Ware Company, $10.

156. For the best exhibition of ornamental earthern ware (vases, flower pots, &c.,) made in this State. Portland Stone Ware Company, $5.

157. For the best oil painting of fruits or flowers. R. Sanderson, Waterville, $2.

158. For the best drawing or other picture of same. (No entry.)

Special Premium. For the best collection of stuffed birds, native of Maine. Albert M. Varney, No. Vassalboro', $5.

SUNDRIES.

Ward's Fertilizer Company, Boston, sample of "Insecticide"; B. Blair, Waterville, pair of antique chandeliers; Sampson & Pike, Norway, patent reversible flower-pot stand —an article claimed to be simple, durable and ornamental, and which was awarded a "complimentary mention" by the committee. Miss Caroline Matthews, Waterville, charcoal sketches, gratuity, $1; also a sketch in oil color, gratuity, $1. Miss Louise Ingalls, Waterville, charcoal sketch; Miss M. Varney, No. Vassalboro', ornamental Albert ware; Miss Mary Matthews, Waterville, landscape in oil; Mrs. W. E. Drummond, Winslow, canned fruits and jellies; E. K. Whitney, Harrison, barberries; T. T. Martin, Waterville, specimens of penmanship; F. E. Nowell, tree pruner; Mrs. Charlotte Jones, Winslow, mineral water. Frank Bowman & Bro., No. Sidney, apple trees from nursery, gratuity, $2.

EXHIBITORS' STATEMENTS ON CRANBERRY CULTURE.

I. BY E. K. WHITNEY, HARRISON.

"The cranberries which I offer for exhibition were grown on common swamp muck. The meadow was prepared, by removing about two feet of the top soil, which was used as compost with animal manures. The vines were set about three feet apart each way on the soil or muck thus prepared. A dam was constructed by which the vines are kept covered with water, from about the first of November to the twentieth of May. They have received no other care as yet, although I think some further attention will be required in the future to prevent the various grasses and weeds from intruding too much upon the premises. I consider the flowing very important to prevent the frost from throwing the vines out, also to prevent the worms from destroying the vines and fruit."

II. By Mrs. A. B. Strattard, Monroe.

"My cranberries were raised upon a piece of ground that is composed mostly of a clay marl with but little muck. In preparing the ground the top or scurf merely was taken off, and the vines planted out immediately. The ground would be called high, as there are no means of flowing it. It is not wet at all during the summer, unless it is a very wet season, although water grasses and moss grow upon it. On three sides of the ground we have a ditch from three to four feet deep, which is hardly ever dry, although it has been dry this summer; yet the land is not what would be called dry, as it gets well soaked in the spring and fall. We never have had any trouble from worms or other insects."

CLASS 5—*Flowers.*

"In this class no article can be entered for more than one premium. Flowers entered for Special Premiums cannot be entered for the Society's Premiums.

All plants and flowers must be in position in the hall at 9 o'clock in the morning of the second day, to enable the Awarding Committees to make their examinations and reports immediately after that time."

First Division.

159. For the best display of cut flowers, filling not less than 100 phials. J. A. Varney & Son, $10; Mrs. A. B. Strattard, $8; Mrs. Peter De Rocher, $5; J. W. Britton, Winslow; Miss Addie Perkins, Fairfield.

160. For the best exhibition of Roses, not less than five varieties. Mrs. Peter De Rocher, $3; James Vickery, Portland, $2; J. A. Varney & Son.

161. For the best exhibition of Dahlias, not less than ten varieties. J. A. Varney & Son, $3; Mrs. Charles Stanley, Winthrop, $2.

162. For the best exhibition of Pinks, (1st premium not awarded.) Mrs. H. G. Abbott, Vassalboro', $1; Mrs. Charles Stanley, James Vickery.

163. For the best exhibition of Japan Lilies. (No entry.)

164. For the best exhibition of Asters, not less than ten varieties. Mrs. C. Stanley, $2; Mrs. A. B. Strattard, $1.

165. For the best exhibition of Pansies. J. A. Varney & Son, $2; Mrs. C. Stanley, $1; Addie Perkins, James Vickery.

166. Zinnias. (Not awarded.) Mrs. C. Stanley, J. W. Britton, J. A. Varney & Son.

167. Phlox Drummondii. Mrs. H. P. Pearson, Vassalboro', $2; I. W. Britton, $1; Mrs. C. Stanley, Mrs. P. De Rocher, Addie Perkins, Mrs. K. B. Lasselle, James Vickery, Mrs. A. B. Strattard.

168. Stocks. Mrs. Moses Getchell, $2; Mrs. Peter De Rocher, $1; Mrs. C. Stanley, Mrs. A. B. Strattard.

169. Balsams. (Not awarded.) Mrs. C. Stanley, Mrs. A. B. Strattard.

170. Chrysanthemums. (No entry.)

171. Petunias. Mrs. H. G. Abbott, $2; Mrs. C. Stanley, Addie Perkins, Mrs. A. B. Strattard.

172. Gladiolus. Mrs. H. G. Abbott, $2; Mrs. A. B. Strattard.

173. Tuberoses. (No entry.)

174. Verbenas. I. W. Britton, $3; J. A. Varney & Son, $2; Mrs. C. Stanley, Mrs. P. DeRocher, Addie Perkins, James Vickery, Mrs. A. B. Strattard, Miss L. M. Pope.

SECOND DIVISION.

175. For the best pair of parlor bouquets. James Vickery, $3; Mrs. P. De Rocher.

176. For the best pair of wall bouquets. (Not awarded.) Addie Perkins, gratuity, $1; Mrs. P. De Rocher.

177. For the best pair of hand bouquets. James Vickery, $2.

178. For the best single bouquet. Mrs. A. B. Strattard, $1; Charles I. Perley.

179. For the best bouquet of Asters. Mrs. A. B. Strattard, $1; Mrs. C. Stanley, Mrs. Peter De Rocher.

180. For the best bouquet of Dahlias. (Not awarded.)

181. For the best floral design. Miss L. M. Pope, $8; Mrs. Moses Getchell, $5; James Vickery, $3; Mrs. Charles Stanley.

182. For the best floral wreath. James Vickery, $2; Mrs. C. Stanley, gratuity, $1; Mrs. P. De Rocher.

183. For the best floral dinner table decoration. Mrs. A. B. Strattard, $1; Mrs. C. Stanley, Mrs. P. De Rocher, Mrs. H. P. Pearson, Miss L. M. Pope.

184. For the best basket of wild flowers. (Not awarded.) Mrs. C. Stanley; Etta Nowell, Fairfield; Mrs. H. P. Pearson; Miss Edith Sawyer, Wiscasset.

185. For the best exhibition of dried grasses. Mrs. C. Stanley, $1; Mrs. Moses Getchell, Joseph Taylor; Mrs. A. B. Strattard; Mrs. T. D. Merrill, Sidney.

186. For the best exhibition of everlasting flowers. (Not awarded.) Mrs. C. Stanley, Mrs. H. P. Pearson, Mrs. K. B. Lasselle, Mrs. A. B. Strattard.

THIRD DIVISION.

187. For the best exhibition of green house plants. James Vickery, $10; J. A. Varney & Son, $8.

188. For the best exhibition of Ferns. J. A. Varney & Son, $3; James Vickery, $2; Frank E. Nowell, Joseph Taylor; D. C. Perkins, Fairfield.

189. For the best exhibition of Geraniums. J. A. Varney & Son, $3; Mrs. H. G. Abbott, $2; James Vickery.

190. For the best exhibition of Begonias. J. A. Varney & Son, $3; James Vickery, $2.

191. For the best exhibition of pot plants. (No entry.)

192. For the best single pot plant. Mrs. Peter De Rocher, $2; Miss L. M. Pope, $1; Mrs. H. P. Pearson, Addie Perkins; Mrs. W. Roberts, Waterville; James Vickery, Miss L. M. Pope, (two entries).

193. For the best hanging basket, James Vickery, $3; J. A. Varney & Son, $2; J. Vickery, $1; Etta Nowell, Fairfield.

194. For the best Wardian case. (No entry.)

195. For the best Aquarium, with plants. (No entry.)

196. For the best rustic stand, not less than three feet in height, to be filled with choice plants. James Vickery, $3.

197. For the best rustic work, (home made) Joseph Taylor, $2.

Special Premiums offered by James Vick, Seedsman and Florist, Rochester, N. Y., to amateurs only.

[Awarding Committee—James Vickery, Portland, and Mrs. Moses Getchell, Winslow.]

For the best collection of cut flowers. Mrs. Charles Stanley, $20; Mrs. G. B. Sawyer, $10; Miss Addie Perkins, $5.

For the best floral ornamental work, Miss L. M. Pope, $5; Mrs. C. Stanley.

CLASS 6—*Garden Crops and Vegetables.*

198. For the best exhibition and greatest variety of vegetables. Peter DeRocher, $8; W. H. Pearson, Vassalboro', $5; R. H. Gardiner, $3; Weymouth Jones; A. H. Ellis, Fairfield Corner; S. R. Sweetzer.

199. For the best exhibition and greatest variety of potatoes, not less than five varieties, one peck of each variety. S. R. Sweetzer, $5; Z. A. Gilbert, $3; R. H. Gardiner; J. W. Lang, Milton Dyer.

200. For the best single variety of potatoes, one peck. W. H. Pearson, $1; Herbert E. Nye, Fairfield Corner, gratuity, 50 cents; Z. A. Gilbert, (two varieties); R. H. Gardiner, Weymouth Jones, (three varieties); Peter DeRocher, W. E. Drummond, S. R. Sweetzer.

201. For the best seed corn, not less than 20 ears, in trace. Galen Hoxie, $2; Alfred Smith, $1; R. H. Gardiner, J. W. Lang, W. H. Pearson, (two varieties); John Emerson, A. H. Ellis.

202. For the best sweet corn, 12 ears. John Mathews, Waterville, $2; Alfred Smith, Herbert E. Nye, Weymouth Jones, Peter De Rocher, W. H. Pearson, Milton Dyer, Mrs. A. B. Strattard.

203. For the best 10 blood beets. Mrs. A. B. Strattard, $1; Alfred Smith, Herbert E. Nye, Weymouth Jones, Peter De Rocher, Frank E. Nowell, W. H. Pearson, James S. Hoxie, A. H. Ellis.

204. For the best 10 turnip beets. Milton Dyer, $2; J. W. Lang, $1; Alfred Smith, R. H. Gardiner, Weymouth Jones, (two varieties); Peter De Rocher, W. H. Pearson, A. H. Ellis, Mrs. A. B. Strattard, S. R. Sweetzer.

205. For the best cabbages, 6 heads. Mrs. A. B. Strattard, $1; R. H. Gardiner, Peter De Rocher.

206. For the best cauliflowers, 6 heads. (No entry.)

207. For the best carrots, 10 specimens. Herbert E. Nye, $2; Milton Dyer, $1; R. H. Gardiner, Peter DeRocher.

208. For the best parsnips, 10 specimens. Milton Dyer, $2; Alfred Smith, Peter De Rocher, W. H. Pearson.

209. For the best ruta bagas, 10 specimens. Mrs. A. B. Strattard, $2; Milton Dyer, $1; Alfred Smith, Weymouth Jones, Peter De Rocher, F. E. Nowell, James S. Hoxie, A. H. Ellis.

210. For the best English or strap leaf turnips, 10 specimens. J. W. Lang, $1; Alfred Smith, John Mathews, Mrs. A. B. Strattard.

211. For the best celery, 6 roots. (Not awarded.) Peter De Rocher.

212. For the best peppers. (Not awarded.) E. B. Merrill.

213. For the best onions, half bushel. (Not awarded.) Herbert E. Nye, Peter De Rocher, W. H. Pearson.

214. For the best tomatoes, 25 specimens. S. R. Sweetzer, $2; Mrs. K. B. Lasselle, $1; Weymouth Jones, Peter DeRocher, F. E. Nowell, (two varieties); W. H. Pearson, Mrs. A. B. Strattard.

215. For the best marrow squash, 3 specimens. (Not awarded.) Peter De Rocher, W. H. Pearson; Henry Smith, Waterville; J. H. Smith, Waterville.

216. For the best Hubbard squash, 3 specimens. Herbert E. Nye, $2; John Lasselle, $1; Peter De Rocher.

217. For the best Butman squash. (Not awarded.) R. H. Gardiner.

218. For the best turban squash. Herbert E. Nye, $2; Weymouth Jones, $1; Peter DeRocher, Mrs. A. B. Strattard.

219. For the best Marblehead squash. A. H. Ellis, $2; Herbert E. Nye, $1; Peter De Rocher, W. H. Pearson.

220. For the largest squash. Herbert E. Nye, $1; Peter De Rocher, W. H. Pearson.

221. For the best pumpkins. John Mathews, $1; R. H. Gardiner, Herbert E. Nye, W. H. Pearson, Hiram Cornforth, Daniel Ayer, W. Jones.

222. For the largest pumpkin. (Not awarded.) W. H. Pearson.

223. For the best musk melons, 3 specimens. (Not awarded.) Peter De Rocher, F. E. Nowell.

224. For the best water melons, 3 specimens. James S. Hoxie, $1; Weymouth Jones, Peter De Rocher, A. H. Ellis, Milton Dyer.

225. For the best citron melons, 3 specimens. Weymouth Jones, $1; F. E. Nowell, Peter De Rocher, James S. Hoxie.

Gratuities. Weymouth Jones for mangel wurzels, 50 cts.; Alfred Smith, Yokohama squash, 50 cents; F. E. Nowell, mangel wurzels, 50 cents.

R. H. Gardiner, Esq., exhibited excelsior oats, worthy of honorable mention; Weymouth Jones, Geo. Merrill and W. H. Pearson, popping corn; Harry Blanchard, egg gourds.

THE ANNUAL MEETING OF THE SOCIETY

was held on Thursday, the third day of the exhibition, at four o'clock P. M., and was well attended. Officers were elected for the ensuing year, a list of whom will be found in another part of this report.

Voted, to dispense with the election of a Corresponding Secretary.

Voted, that the reports of the Treasurer and Executive Committee be presented at the Winter Meeting.

Voted, that the thanks of the Society be and hereby are tendered to the town officers and citizens of Waterville, for the use of the Town Hall and for other facilities afforded by them for holding the annual exhibition; also to the several railroad companies of the State for return tickets, and to the Eastern Express Company for liberal concessions granted to the Society.

Voted, that the time and place of holding the Winter Meeting be referred to the President.

Adjourned to meet at the office of the Secretary, in Wiscasset, on the 26th day of December next, (to be thence adjourned to the time and place appointed for the Winter Meeting.)

PROCEEDINGS OF THE WINTER MEETING.

The fifth annual Winter Meeting of the Society was held at the Town Hall in Winthrop, February 27th and 28th and March 1st, 1878, by adjournment from time to time, of the annual meeting, and in accordance with notice duly issued.

The order of exercises, as announced, was substantially carried out, although some topics of minor importance were withheld for want of time, and some others by the absence of the persons to whom they had been assigned.

The sessions were well attended and a good degree of interest manifested in the proceedings. As usual at the Winter Meetings of the Society, there was an exhibition of winter fruit and a few cut flowers, &c. The Diploma awarded to the Society by the Centennial Commission was placed on exhibition in the hall.

FIRST DAY—Evening Session.

The Society assembled at the time appointed, and was called to order by the President, who briefly stated the purposes of the meeting, and invited all present to participate in the exercises.

Mr. B. C. Torsey of Winthrop, welcomed the Society in behalf of the citizens, in an elaborate address, alluding at length to the early history of the town and its agricultural organizations, its advanced position in all moral and intellectual movements, its material prosperity, and particularly to its extensive and successful efforts in fruit culture. Mr. Torsey's address was listened to with close attention, and was briefly replied to in behalf of the Society by the President and Secretary.

President Gilbert then addressed the meeting, reviewing the history of the Society, stating the purposes of the Society and the measures which had been adopted from year to year since its organization to promote the interests of fruit culture in the State. He also spoke of the advantages of meetings of this character, and the mutual benefits to be derived from them.

The President then presented a paper contributed by Dr. N. T. True of Bethel, who was not present, "on planting an orchard," being a sequel to the valuable paper read by him last year on the same subject.

PLANTING AN ORCHARD.

By N. T. True, M. D., Bethel.

In the spring of 1877, I set out a young orchard of apple trees. I planted it for posterity. All the pleasure I anticipate from it is that which may arise from seeing the trees grow from year to year, and the care I may bestow upon them. Several points in my present and past experience seem to me worthy of note, which I will record, with the hope that now and then a hint may be received by others worthy of their commendation. I shall, therefore, describe my labor in this direction quite minutely.

Preparation of the Soil.

Three years ago, I selected a little more than two acres of land in my field for an orchard. The soil was full of large and small boulders, the most of which I removed the first and second years, by digging, blasting, or sinking. Broke up the land in autumn, as deep as I could, and planted with corn and potatoes the following spring. The former was hoed three times, the latter twice. Plowed again in autumn, and dug boulders. This was repeated for two years. By plowing late in autumn, I have subdued the witchgrass on one acre, simply by keeping the ground under clean cultivation where I raised corn, and tilting out the grass with a five-pronged fork, or potato digger, after the crop was removed. I cleared an acre in one day, though a portion of it had not been badly infested.

Last April I cross plowed, and followed it with the cultivator and harrow, till the ground was as mellow as I could make it, and dug the holes twenty-five feet apart, none being less than ten or twelve feet from fences between me and my neighbors. I threw out the soil as deep as the land had been cultivated, each hole occupying a little more than a square yard. I then took a long pick and loosened the hard subsoil as deep as I could all over the bottom of each hole. A half bushel, more or less, of stable manure, was thrown into each hole, and carefully chopped into the loosened subsoil with a hoe. This last operation I deem of the greatest importance. It prepares an excellent bed for the roots of the tree, which will be sure to penetrate it, besides preventing the drying up of the soil during a drought, by which so many trees are killed. Could I have had my time at command, I would rather have dug the holes in autum. Planted with corn and potatoes as before.

TRANSPLANTING THE TREES.

I selected a rainy day, took the cars and visited the nursery of John S. Holmes, Esq., who resides a mile and a quarter from Oxford G. T. R. Station. His nursery is nine years old from the seed. The trees are of a slow, but healthy growth. On cutting through the wood it looked white, like white oak, a good sign of a healthy growth.

With the aid of three men, I selected and dug one hundred and sixty trees, cut squarely off the second and third stories where necessary, but carefully avoided cutting off any lower twigs or branches, unless very near the ground. The object of this course was, to save the stock in case of failure in grafting. I packed them in bunches of ten each, and immediately sent them, by previous arrangement, on the cars to Bethel, and at once transferred them to my orchard. The roots were kept wet till they were planted, by covering them with wet straw. Many trees are destroyed every year by having their roots dried so much that they do not leave out till July, or even August, as I have had another lot from another nursery do the past year. Their vitality is destroyed, and the most of them are worthless.

SETTING OUT THE TREES.

While setting out the trees four men were employed, to each of whom was assigned a special duty. One assorted the trees and distributed them; another shaped the hole; another held the tree, while the fourth arranged the roots, carefully filling the earth under the trunks and roots, so the tree would stand erect without any soil over the roots. Some soil was next thrown over the roots, followed by a little manure and soil, the whole being carefully pressed down. By this division of labor, a large number of trees may be carefully planted in a single day, while in no case was any manure placed in immediate contact with the roots.

Previous to setting the trees, with a sharp axe I cut off, on a block, with a slanting stroke, all tap-roots and any other roots that had been bruised. I was also careful to turn the side of the tree to the north from which any large branch had been cut close to the stock. Unless this is done, it will be much exposed to the sunscald. I leaned the stocks *very slightly* to the south for the same reason. Not a few trees are killed by the dreaded sunscald simply by leaning to the northeast. A few trees which after all these precautions are thus exposed, I protect by loosely winding around the trunk some old rags.

The next step was to drive down two cedar stakes, to one or both of which the tree was fastened by spun-yarn. Many young trees are killed by being racked back and forth with the wind.

After the trees had all been set, I clipped the extremities of the long branches, and then carefully covered every wound and bruise with soft grafting wax. No twig was too small to be passed over, and I went over the orchard several times for this purpose during the summer. I have seen no instance of bleeding, or a blackened surface. Even old wounds from previous trimming were kindly remembered. I planted the ground again with corn and potatoes, and kept them under as clean cultivation as possible. During the last of June I mulched the trees, which were set on the driest part of the orchard. For this purpose I used green brakes gathered from the pastures.

The Results.

The trees put out vigorously, much as if they had never been transplanted, and shoots from four to twelve inches in length were not uncommon by the middle of July. The plant lice attacked them at this time to such a degree as utterly to stop their growth. I tried the experiment of affectionately pressing the twigs covered with the lice between my thumb and forefinger, but with no manifest advantage. By the last of July they all disappeared, and the unusually wet weather of August caused the shoots to start again, so that now, a stranger would declare that there are two years of growth where really there is but one. A perfect joint is formed between the growth of the early and latter part of the season. In one instance I measured a growth of thirty-two inches during the season, while a changed aspect was manifest in the tops of a large majority of the trees. Every week, or oftener, with knife and grafting wax, I pruned every dead or useless twig, and covered every wound with wax, and pressed the wax previously put on closer to the wound, and watched the hatching out of caterpillars, and killed them.

The next step was to guard against the mice and borers. For this purpose I found a pile of empty tomato cans, which I threw into a fire to unsolder them. Taking the body of one of these cans, I rolled it somewhat spirally around the trunk of the tree and then slipped it to the ground, and next to the fence, where the trees are more exposed to the mice, I wound another still more spirally above the first coil. A very little practice will enable one to do this successfully. Borers do not like to descend inside of the coil to deposit their eggs, while by slipping up the coil their presence can easily be detected. I have not yet gone over the whole orchard, and regard it rather as an experiment, with the hope that it may, at least, partially succeed in warding off these much to be dreaded enemies.

SUBSEQUENT TREATMENT.

During the autumn I turned two back furrows against each tree in one-half of the orchard so as to form a square in which the tree stood. The furrow left was just outside the original hole. I threw out the soil from the bottom of the furrow on the four sides of the square, picked up the subsoil and chopped in manure, and also put a little manure above it and covered it. This with the previous manure will give a "*square meal*" for the tree every day for two or three years, and avoid what should always be guarded against—a check in the growth of the tree. The coming spring I propose to graft the largest stocks and follow it up from year to year as fast as they are of suitable size for the purpose.

REFLECTIONS AND SUGGESTIONS.

Many persons look upon such a course as I have pursued as one involving much labor, but the planting of trees in the way I have described can be rapidly done, and well done, by taking hold of it in a resolute manner. I see nothing in my course that I could have well omitted, and I now see no reason why every one of my one hundred and sixty trees may not live and thrive. If they do, it will be the result of painstaking.

Some persons would object to setting out seedling stocks so old as mine. It should be stated that Mr. Robinson took good care of his trees by keeping them carefully trimmed. Too many seedling nurseries are ruined from neglect to trim them from year to year. My past experience has been in favor of setting out trees from seven to ten years old, provided they have been properly cared for in the nursery, and receive the same attention in subsequent years. It is the steady and healthy growth rather than the age and size of a tree that should be taken into the account in transplanting a tree. Extremes, however, should be avoided. It should be remarked that the last season was one of the most favorable on record for planting trees.

Some persons prefer grafting the trees when transplanted. My limited experience in this has not been so successful, and I prefer to wait till the trees are well rooted, and the stocks are an inch or so in diameter, and graft them at least three feet from the ground.

A friend of mine, who is a blacksmith, informs me that he makes a little hill of cinders from his shop around each tree to keep off the mice. He has found their nests in the spring close up to the hillock without their finding the tree.

As it has been suggested by a successful pomologist and member of this society, Mr. A. Smith of Monmouth, there is a rage to set out very large orchards. I have something over three hundred trees, and I am certain that I can spend all of my time during the year in looking after that number. As he suggests, the farmer who has forty trees, will find enough to do to care for them, as Mr. Smith cares for his, in connection with his other farming labors.

I propose to keep the land of my new orchard under cultivation for a series of years. It is of doubtful advantage to have a tree come into bearing very early. It is apt to be the sign of dwarfishness, or of premature death. It is better to wait patiently, but keep the trees in a vigorously growing condition until they are capable of producing half a bushel, more or less, of apples in a single crop. One of the best young orchards I have seen in the State is that of Daniel B. Grover, Esq., of West Bethel. The trees were grafted into seedling stocks nine years ago, and the ground has been cultivated with hops nearly all the time since. They are large, sleek looking, and just beginning to bear. The ground is kept entirely clear of weeds, while the borers receive no welcome. No mulching was used, so that borers could be detected at once, while the hop poles protected the trees from sunscald.

While cultivating among my own trees, I use a short whiffletree, taken from my mowing machine. If the direction of the cultivation is east and west, and north and south, set your two stakes on the northwest and southeast sides of the tree, and there will be but little danger of injuring them.

It is no trifling task to raise an orchard of one acre and have every tree in a healthy condition. There is a constant warfare against drought, winter killing, caterpillars, snow, sunscald, accidents, blight, borers, aphides and starvation, to say nothing of failures in grafting, and trees that refuse to bear. A man must make up his mind for all these contingencies.

Some localities may be exempt from these obstacles, but they are exceedingly rare; and a fainthearted man should never plant an orchard. It requires about as much courage to tear up a black-hearted young tree, or one surrounded with sprouts, as to have a decayed tooth extracted that does not ache.

It is a too common mistake, in writing on the subject of pomology, to endeavor to establish modes of practice that will apply to all locations. Nothing is so unsafe. Difference of soil, and location, the adaptation of special kinds of trees to special localities, which can be learned only from long experience, the deficiences of particular elements in certain soils, and other modifications, are everywhere met. The good judgment of the pomologist must be above the opinions of the writer and theorist; and he must reject, or accept opinions as in that higher judgment he may think best. There are and should be no patents in pomology. It is with this spirit that I modestly have described my own course in planting an orchard.

Mr. W. P. Atherton of Hallowell. I have been much interested in the paper by Dr. True which has just been read, and I think he is right in his ideas. I would like to know if there will be an opportunity for any discussion on the paper we have just listened to?

Mr. Sawyer of Wiscasset. It seems to me that there are some points in the paper of Dr. True's which should receive attention sometime during the meeting. I think the paper is in itself very complete, but perhaps there may be different views on the subject, and that it would be well at some time to call it up for discussion.

The paper was laid on the table, and the meeting adjourned to Thursday morning at nine o'clock.

SECOND DAY—Morning Session.

The business meeting of the Society was adjourned till five o'clock P. M.

At the opening of the public session the President announced the order of exercises for the day, and said:

We have a few minutes before the advertised time of beginning the meeting, and since a goodly number of persons are present, we may as well fill up the time with the consideration of some topic. There are some points in the paper presented last evening which it may be well to consider for the information of those present. I will allude to one or two of these points, and ask for remarks upon them. One point which he dwelt upon quite forcibly, was the importance of thorough work in planting trees, as you will recollect, claiming that by giving them careful attention you would in the end be compensated for the extra expense. It is a good point, and one which may be referred to more at length. Another is the question of planting grafted or seedling trees. According to the experience of individuals present, which are the more desirable, seedlings or trees grafted in the nursery? Secondly, provided seedlings are planted, at what time is it desirable to graft them, and what method would you advocate, cutting the branches and grafting, or cutting the whole stock? Third, the question of sunscald, which he refers to. What is your experience in regard to that, and the recommendation of leaning the trees slightly to the south, in order to avoid this difficulty? Is there anything in that? Then, perhaps, there is a question it might not be necessary to bring up—ought we to caution any one in regard to forcing trees in this State? Do we need to give any warning in that direction? We have a severe climate, and if the growth is forced and there is no opportunity for that growth to mature, there is danger at times of winter killing.

Mr. **Berry** of Winthrop, spoke of the proper distance apart for planting apple trees, and thought thirty or thirty-two feet better than twenty-five, giving a better opportunity for cultivation. An orchard should be thoroughly taken care of to make it profitable.

Mr. **Pope** of Manchester. I would inquire if any one present has had experience with sunscald? Dr. True speaks in his paper of the bark cracking and turning black, and trees dying from these causes.

Mr. **Berry**. I have had some experience. The trouble is greatest with trees leaning towards the northeast. I would advise putting up boards for the protection of those trees which are affected.

Mr. **Pope**. We are troubled much with prevailing west winds killing our trees.

Question. And so you lean your trees southwest?

Mr. **Pope**. I think the remedy spoken of to be as good as anything I know, and perhaps the only remedy there is.

Question. What in your opinion is the cause of sunscald? Is it the hot sun of July and August, or is it caused by the premature starting of the sap?

Mr. **Pope**. My opinion is, that when a tree has not enough foliage the heat of the sun scalds it.

Mr. **Sawyer**. I have experienced considerable difficulty in this respect with a few trees which are fifteen years old and quite large. I found it necessary to cut off some of the lower branches, and where I cut them on the southerly side, or more to the southwest, the bark afterwards withered and came off in several cases nearly down to the ground, which I could not attribute to anything else but to the cutting of those limbs, while on the other sides of the same trees no injury resulted.

Mr. POPE. I wish to know, if from the places where you cut those limbs the sap ran down during the summer?

ANSWER. I think not.

ALFRED SMITH of Monmouth. I think Mr. Sawyer is right in thinking that the trouble in his case resulted from cutting the limbs and not from the sun. In cutting a limb, especially if the water gets into it, it begins to die at a certain point. I think I never saw the white wood of an apple tree bleed at any time of the year. If it did I could not make the wax stick in grafting. Every one knows that if a limb is cut from a tree which is black-hearted, and the wound covered with wax, the water which exudes will run down and cause a black spot on the tree or limb, but I never have learned that that black injured the tree. I have often rubbed it off and found good bark beneath. It is only a coloring matter that you see, which comes from rotten wood and not from the white wood.

CHARLES FOSTER. I have been somewhat in the habit of working orchards in different places in the county of Kennebec, some five or six towns. I never remember of finding a single scald on the north side of a tree, or the under side of a limb. For the last seven or eight years I have been in the habit of setting trees with a cant towards the south and southwest. I have followed grafting for thirty years, more or less, and I do not remember of seeing the sap run out of a single apple-tree limb of white wood. In grafting there is danger of cutting off too much of the top at one time. I have generally been two years in trimming and grafting a tree and fitting it for bearing.

The PRESIDENT. Do you prefer grafting the branches or the main stock?

Mr. **Foster.** I have been in the habit of grafting on the stock.

Question. Which do you recommend as the best practice, planting seedling trees or trees grafted in the nursery?

Mr. **Foster.** When I first began to set apple trees, sixty years ago, perhaps, there was but little grafting done in this county, but of late a good many people in Maine have been setting New York trees. I have been in the habit of setting trees not grafted. In regard to New York trees, I have no doubt but they would do well if we take sufficient care of them, but to give them the care we used to forty years ago, they will not amount to anything.

Mr. **Smith.** I have grafted with you (Foster) a great deal. My experience is, decidedly, that in this State we had better set seedling trees and graft into the body or branches. If the bodies are too long, they should be cut back. I hold that we had better have the trees nearer to the earth. Everybody ought to know how to graft. It is a very simple thing to do. Every boy ought to learn it. I could relate my experience in learning, but will not take up the time. In relation to cutting large limbs and grafting all in one year or otherwise, I believe it is better to start the scions all in one year, leaving enough limbs to be renewed gradually afterwards. In that way you keep the trees balanced, and all the scions start together. When I first began to graft, the under limbs were left for the next year; we grafted the best part of the tree, and they would grow rapidly, while the lower limbs, grafted afterwards, were always behind and would never get up again. When scions are put all over the tree, and started at the same time, you will have an equal growth. In a small tree it will do to cut off the entire top; in a large tree I would not generally do it.

Mr. **Berry** agreed with Mr. Smith on the last point.

N. R. **Pike** of Winthrop. I would ask, if a tree needs cutting back, what time would you prefer to do it?

Answer. It is better to be done before it leaves out. I have succeeded well in that way, and have seen a great many handsome trees set out with large tops and they never became well established and growing on account of this very thing; and when I have grafted them, I have found them to be black-hearted; whereas if they had been properly cut back and allowed to go until the next year, it would have been much better. I think it is well to cut about six inches above where you intend to graft, and let it go one year.

Mr. Pike. I would ask whether you set the scions the first year?

Answer. I have succeeded well in that way, and I can show you handsome trees done in that way.

Mr. Foster. In regard to this sunscald, I made up my mind years ago that it was owing to the freezing and thawing of the tree in the winter. I have worked in orchards of 18 to 20 acres, and I have found the tops of trees where they came to the sun that the bark would crack open. I have noticed it frequently in the woods, on the side of the tree facing the sun sometimes two or three feet would be dead, and I have thought it was owing to the sap starting and freezing in the winter and killing the bark in that way.

Mr. Wheeler of Winthrop. I have had some experience in grafting; have done considerable of it some years; have set 30,000 scions in one year. I have always made it a point to go into a tree and examine and look it over and see how to shape the top. I think that is one of the first things necessary. I always want scions that I know to be good, and in grafting large trees I leave some of the smaller limbs between the scions and the stocks, to help carry the sap to the scions. I have noticed failures where the trees have been cut back too much, and in many cases complete failures. There has been something said here, I think, in regard to cutting the whole top of small trees. I think the better way is to get trees large enough to graft into the branches. I think there is danger of forcing trees too much before they are set out. Within the past four years I have lost two trees. The sap started in a warm time and caused the bark to start, and I am of the opinion that sunscald is produced somewhat by the starting of the sap prematurely.

Mr. SAWYER. You mean too early in the spring?

ANSWER. Yes. I have not put out many trees lately. The few trees I have set I have raised myself, and I have a few very good trees. I believe we can raise trees here as well as anywhere, with proper care and labor.

QUESTION. You plant seedling trees?

ANSWER. Yes, sir, I prefer them.

QUESTION. What time of year do you prefer to cut scions?

ANSWER. I think it is best to cut them in the fall.

Mr. PIKE. There is a point introduced by Mr. Sawyer in regard to cutting the large limbs, and the bark dying below where the limb is taken off. I think that cannot be termed sunscald, for in my experience you are as likely to have that upon the north side as upon any other.

Mr. SAWYER. I have not found it so.

Mr. PIKE. I have, and my experience is that when you take off one of these limbs the sap cannot flow; there is nothing to take the sap, so it runs through under the bark and corrodes and kills the bark.

The PRESIDENT. It is time to take up another subject, but I wish to enquire in regard to the practice of orchardists, whether they prefer to set seedlings or trees grafted in the nursery?

Mr. ATHERTON. I would like to have time for this subject to be discussed more fully in regard to whether it is best to graft in the stock or in the branches. I suppose this discussion was drawn out by Dr. True's paper, and if I am not mistaken he alluded to the subject of grafting. Downing says, I think, that the trees ought to be allowed to grow one year before grafting them, but that it might be necessary in some cases to graft in the same year that the tree was set. What I am coming at is, whether it is better to graft in the limbs or stock, for I am going to set more trees in the coming spring.

The PRESIDENT. The question of Mr. Atherton was answered previous to his coming into the room, but for his benefit I will say that the opinion of those who have had experience in the matter is, that it is better to graft in the branches, and that is the general practice, unless in shaping the tree it becomes necessary to take the whole top off.

OAKES HOWARD of Winthrop. I wish to say a word in relation to the sunscald. The question has been pretty thoroughly discussed, and the opinion is that we suffer more or less by it. Now, what I wish to know is, in regard to a remedy.

The PRESIDENT. The point is very practical; but this discussion is taking too much time. I wish to call your attention to another question just now propounded, and ask the opinions of gentlemen upon it. I will ask of Mr. Carr whether he prefers to set grafted trees or seedlings?

Mr. CARR. I prefer the seedlings. I don't want a tree grafted until it is set.

Mr. POPE?

ANSWER. Seedlings by all means.

Mr. ROBBINS of Winthrop. I certainly should favor the seedling trees, and also grafting in the limbs, although I have had some success with trees grafted in the nursery.

F. M. WOODWARD. I set seedling trees mostly, and prefer them. There is a point which I wish to present, and that is, why you graft in the body of the tree? I would never do so if I could avoid it.

Mr. FLOYD. I prefer seedling trees, by all means.

The following resolution was adopted:

"*Resolved*, That this society recommend the setting of seedling trees, to be grafted in the limbs or stock, rather than trees grafted in the nursery."

The PRESIDENT. We will now take up the subject of Crab Apples. First, we have a paper by Dr. Reynolds, and after that we will devote some time to discussion of the subject.

RAISING CRAB-APPLES.

BY HENRY REYNOLDS, M. D., AUBURN.

Fruit-growers in Maine have had much to discourage them during the past ten or fifteen years. The severity of the winters and the ravages of insects have destroyed a large part of the old orchards, while numerous difficulties beset the raising of new orchards. It is an acknowledged fact that trees do not grow so readily as they did fifty years ago. Then, if trees were set out, a flourishing orchard was pretty sure to result, whether any care was taken of the trees or not. Nearly all that seemed necessary, to secure a good tree, was that the seed should be placed in the ground or the tree set where it was desired to grow; almost invariably a good tree would be produced.

Now, it is altogether different. The tree must be transplanted with extra care, placed in a good location, in the best soil, cultivated, manured, protected from mice, borers and other enemies, in fact tended and cared for almost as industriously as a child is cared for, in order to secure a tree. Even when the tree has at last been produced, the owner is not sure of long possessing his treasure. Insects may destroy it, frosts may kill it, or disease blight and blast it.

In view of all these difficulties attending apple-tree culture, it is not strange that many at times have become discouraged, and look about them for trees of a more hardy character than the varieties usually cultivated. Obliging and enterprising tree agents have aided them in this search, and presented for their consideration the crab-apple. The case of the crab-apple has been ably presented by its earnest and unwearying advocates. The case at first was presented a little stronger than it would be prudent to state it at present. The crab-apple was said to be just the tree to endure our winters, would grow thriftily, bear abundantly, and the fruit sell at fancy prices. It was claimed that when the common standard kinds of apples were selling in Boston at two to three dollars per barrel, the crab-apples sold at six or seven dollars, and were in demand at those prices far in excess of the supply. By engaging in crab-apple culture, astonishingly profitable results were predicted and anticipated. It was urged that the demand would be almost unlimited; that those not used for cooking purposes could be converted into cider, which would sell at fifty cents per gallon—crab-apple cider being a very superior article.

The agents who had crab-apple trees to sell, seemed to believe that they had a good thing, and tried to impress the minds of farmers with some adequate conception of the great importance of crab-apple culture. Their success was quite encouraging—to themselves, at least—and large numbers of the trees were sold. Not a few purchased crab-apple trees sufficient to set a small orchard, imagining that at last they were on the high road to success in fruit culture. They did succeed in growing the trees very well. There were quite as many that lived and grew as it was for the interest of the owners to have.

There is no doubt the crab apple trees are hardy and adapted to endure our climate. This point has been satisfactorily established. The trees are thrifty and productive, and come into bearing very early. So far as all these points are concerned, the crab-apple tree culture in Maine has proved a complete success. There seems to be no doubt that we can raise any number of large, thrifty, and productive crab apple trees. There can be no fault found with the representations of the tree agents regarding these qualities.

There is, however, a serious drawback attending even the crab-apple business; and that is, the apples do not sell well. This seems to be a great pity, when it is so easy to raise them and the trees are so thrifty and endure our winters so well! Instead of being in demand at $6 to $7 per barrel when other apples are worth only $3, the demand last autumn was not brisk for them at $2 to $3 per barrel while other apples sold at $3 to $4. In fact, there is a very limited demand for crab apples at any price. They are used mostly for preserving, and seldom used for other cooking purposes. It is easy for any one to see that the demand for crab-apples can never be extensive enough to consume a fourth part of the product of all the trees which have been set.

What is to be done with them, then, it may be asked? Use them for cider, some one says, and sell the cider for 50 cents per gallon. Of late years we have not heard anything about selling crab-apple cider at fifty cents per gallon. I presume it would sell at about the same price as other cider. But, suppose the crab-apples be made into cider. Imagine a man picking crab-apples for cider! Crab-apples cling tenaciously to the tree. They seldom fall off, high winds do not blow them off; a man in the top of the tree, shaking the tree vigorously, makes slow headway in shaking them off. In short, crab-apples have to be *picked off*. They are very small in size. It requires hundreds of them to fill a bushel basket. If a man were given all the crab-apples for cider making that he could pick during the whole autumn, he would not become rich fast enough to cause his neighbors to envy him at all. But when a man is obliged to raise as well as to gather them, then we begin to feel like sympathizing with him regarding his hard lot in life. Yet, for an opportunity to do this very thing there are many who seem to be taking great pains, purchasing trees, carefully attending them and giving them the use of their land; and for what? just to secure a harvest that is not worth harvesting.

It seems as though it were about time for farmers and fruit growers to stop buying crab-apple trees to set for orchards. Already there are more crab-trees growing than it will be possible to advantageously dispose of the fruit. It is all well enough for any one to set one or two crab-apple trees to secure fruit for his own use, and then when the trees begin to bear freely he will have as much crab fruit as he can profitably dispose of.

Some persons in setting crab-trees have thought if the fruit did not sell to advantage, that they could easily have the trees grafted to other varieties. This can be done, but there is considerable risk attending it, as our standard varieties of apples can be grafted upon crab-trees with less certainty of good results, than when grafted upon our native trees. Besides, many of these crab-trees are produced by grafting upon the common apple stock, and to re-graft them occasions much unnecessary labor, at considerable risk to the life of the tree, without giving any advantages thereby.

The original crab-stock for grafting standard hardy varieties of apples upon, has been used by nurserymen who are propagating trees for the trade of the northern N. E. States. The claim has been made that a hardier tree was thereby secured, and one that will better meet the wants of orchardists in the localities above named, than would be the case if grafted upon common apple-stock. The practice, however, is of doubtful utility, and cannot be recommended. Indeed, experience as far as continued, proves no foundation for the claim of superior hardiness. We have hardy apple-stock, and to this we shall find it to our advantage to confine our attention.

The PRESIDENT. Gentlemen, you have heard the ideas of Dr. Reynolds in regard to the value of crab-apples. If any one has views which he wishes to present upon any point in the paper we will listen to them.

Mr. BRACKETT of Belfast. It seems to me hardly probable that this meeting will recommend the planting and raising of crab-apples, and I think the tenor of that paper accords well with the opinions of the members present. It seems to me there are other subjects more important. Therefore I move we accept the paper for publication.

Mr. SMITH. I fully agree with the paper. I would not alter a word of it. Crab-apples are not worth the picking.

Mr. ATHERTON. I have ordered eight crabs; I don't know but I shall change the order. Downing tells us there are some of them, though, which do grow to large size and are valuable.

Mr. CARR. I will call upon Mr. Litchfield, I think he brought some crab-apples here to exhibit.

Mr. LITCHFIELD of Winthrop. I am glad that the President sat in front of the place where those apples are exhibited so long as he did. I invested in five varieties of crab-apples sometime ago and have them growing now. I do not condemn them all. I have one variety which is valuable, and one that is good for nothing; it cannot be cooked or eaten, or given to any creature. So I have a large lot of them. I hope nobody else will be taken in as I have been with this kind of tree. I have another variety which is valuable for preserving.

QUESTION. What kind of an apple is the General Grant?

ANSWER. I have not got it and I do not want it.

JOHN MAY, Esq. My opinion is that the crab-apples are in general an immense humbug.

Mr. WHEELER. I have only a word to say. I have had a little experience. I have one crab-apple tree. I got the scions from friend Smith. I was considerably taken up with them at that time, but I have found them since to be worthless. Soon a yellow variety came around and I had the curiosity to try that. I grafted the tree over and put in the yellow variety. The tree bore well. These were pretty good to can up for sauce. By and by another variety came around—a Siberian crab. It was quite a large apple, was red and handsome. I grafted it again to that variety, and last fall it bore largely and produced a fine lot of sauce apples. I think it would be a good thing for every fruit-grower to keep one or two trees just for sauce and for home use.

The PRESIDENT. The point has been well made, What is the use of crab-apples where we can grow good fruit? And that is a question every one should ask himself before he gives an order for crab-apple trees at extreme prices. Allow me to ask who would not prefer a bushel of Roxbury Russets to a bushel of crab-apples? Who is there that cannot make a better use of Winthrop Greenings than of crab-apples? Is not the Gravenstein or the Red Astrachan better? Again, who is there among these fruit growers who would not prefer to raise a bushel of good fruit (and cannot do it easier) than a bushel of crabs, and who cannot sell them for more money? Of what earthly use then is the crab-apple? Why do people persist in buying them? Here comes in the question, Are there any localities where common apples cannot be grown, and crabs can? If you can find that place, there is the place for the crabs. Unless you find that locality I do not see any reason for growing them. I hold in my hand a catalogue of fruit advertised by a prominent fruit grower. He is inserting the Tetofsky as "an excellent apple," and entirely misrepresenting it. In connection with this subject, I wish to read a brief article which I cut from the *Maine Farmer* of last week, written by Dr. Hoskins of Orleans Co., Vermont; and you know that is a section of the State where the winters are hard and they find it difficult to grow many of the varieties of apples which succeed well elsewhere:

"CRAB-STOCKS AND RUSSIAN APPLES.

I read the letter of Mr. Smith of Monmouth in the last FARMER with much interest, and I wish to enforce what he says of the 'crab-stock humbug,' with my own experience. It has got so in Vermont that a tree agent says 'crab-stocks' to one of our fruit-growers almost at the risk of his neck. And now, as I judge from numerous letters of enquiry which I receive, these pedlers, finding no market at home for their trees. are flooding over into New Hampshire, Maine and New Brunswick in crowds, and defrauding many honest men with their plausible talk.

Let me say to your readers that the crab-stock has had a thorough trial in the northern part of Vermont, running over a period of nearly twenty years, and that the only result is utter failure. So far as I am informed (and I have probably as good a chance to know as any man). there is not, from the tens of thousands of crab-grafted trees sold through the country where I live, one single really successful orchard. The trees begin to fail almost as soon as they come to bearing, and excepting a few cases where, by deep planting, the trees have rooted above the graft, they rapidly become unthrifty and die. The experience is very nearly that of pears on the quince, only the failure is worse. In many cases not only is the tree unhealthy, but the fruit seems to partake of the crabby nature of the stock to the extent of being uneatable and unsalable.

One point in Mr. Smith's letter, however, needs a little correction. Twelve years ago I believed, like him, that the Northern Spy, Talman's Sweet, Yellow Bellflower, and the Winthrop seedlings Moses Wood and Fairbanks, were as hardy as the Russian apples, Duchess of Oldenburg, Tetofsky and Alexander. This belief has been a costly one for me, and will be so to all your readers living in Northern Maine who accept it. I set dozens of those "hardy Maine apples," and they are all dead or dying, while my orchard of Tetofsky and Duchess are thrifty, productive and profitable. Yet, I do not advise the setting of Russian apples in Kennebec county, or anywhere where the Winthrop Greening, Moses Wood or Fairbanks will succeed. These last named are unquestionably better in quality than any Russian yet known. But for the Aroostook region, and all similar localities, I say set the Russians by all means, but not on crab-stocks.

T. H. Hoskins, M. D.

Newport, Vt."

That is the opinion of a man who has had much experience in regard to the question of using crab-stocks for grafting as a means of securing extra hardy trees. Tree agents have been canvassing the State of Maine with good success in making sales of these trees, which he totally condemns.

C. R. Rice of Whitefield. I hardly see if so great a fraud is being practiced upon the people, why the names of the parties should be withheld from us, and I will call upon you for the name of the nurseryman you have alluded to; and I would like further to say that the section of country where I reside, has been overrun by parties doing the same thing, viz: swindling the people. They come in this wise: "There is a beautiful crab-apple tree. It will endure the winter, it is an annual bearer, it is tough and hardy, just what you want," etc., etc., and in this way a great many are buying quite large quantities of these crab-apple trees. I would ask what shall be the remedy? Who wonders that people are buying extensively? They are as a mass ignorant of the real character of the trees they are buying. They often really suppose they are getting a good tree; just what the agent recommends it to be. It is hardly right to say, "let them find out for themselves in regard to these matters." I think it one of the duties of this Society to enlighten the people of the State in relation to this subject. You see posted all through the State, little papers saying, "Wanted by such a firm, good, reliable, temperate men, previous experience not necessary, to canvass this State." And it is for these very crab-apples. I say, gentlemen, are we going to stand it? or are we going to take measures to protect ourselves? We cannot do so by passing this question. We can only do it by bringing it before the people, and by presenting them with something better.

Mr. **May**. I think if people would only consider, there would be no need of their being imposed upon in that way. What gave it the name crab-apple? The name of itself is suggestive of the quality of the fruit.

Mr. **Briggs** of Turner. I wish to relate a little incident. When I was in Bangor at the State Fair a few years ago, there was a tree vender there from my own county, and he made the statement that he had made from crab-apples, cider, and from that cider, wine, which sold at $8.00 per gallon. These are the very men whom we do not see at such meetings as this. I think there is much humbug in this direction.

Mr. **Litchfield**. I notice the Secretary tasting a piece of a crab-apple. I would ask him if he thinks they will make good cider?

Mr. **Sawyer**. I wish to have the gentleman taste for himself. I should call it a *crabbed* apple,—bitter, astringent and totally worthless.

Mr. **Smith**. If a man wants a tree for an ornament the crab-apple tree looks well in the fall when loaded with fruit, and in the spring with its blossoms. That is, I should suppose, about all we want of the crab-apple tree.

Mr. **Brackett**. I was about to say, that it seems to me that we are almost wholly united in our opinions on this subject, and it further seems to me there should be something done to go before the people of this State to show our disapprobation, more than simply to say that we merely objected to it. I think we ought to adopt a resolution condemning the practice of planting crab-apple trees in Maine, or that we regard them unsuitable for growing in our State.

Mr. **Pope**. There is another point which ought to be ventilated, and that is the use of the crab-stock for grafting.

The **President**. A motion to amend will be in order.

Mr. **Rice**. I would move an amendment. I think the words 'totally worthless' should be inserted; that is, totally worthless for general growing.

Mr. Sawyer. For general cultivation or as a stock for grafting?

Mr. Rice. As being totally worthless for general cultivation, and also as a stock upon which to graft standard varieties.

The resolution offered by Mr. Brackett, as amended, was adopted.

Mr. Robbins of Winthrop then presented a paper on his experience in fruit culture, the manuscript of which was not presented to the secretary, and is, therefore, omitted.

Adjourned till afternoon.

At the opening of the Afternoon Session, a committee consisting of Messrs. Atherton of Hallowell, Briggs of Turner, and Rice of Whitefield, was appointed to examine and report upon the fruit on exhibition.

The first subject assigned for the afternoon was then taken up, viz: "What means are available, if any, to permanently restore the productiveness of our orchards?" and the following papers were presented:

OLD ORCHARDS, AND THE BEST METHODS OF RENOVATING THEM.

By W. P. Atherton, Hallowell.

Allow me to call your attention to a very important, though familiar subject; a subject upon which much has already been said and written, and yet a subject upon which we need precept upon precept and line upon line. It is the matter of renewing or renovating our old orchards, and it may very properly occupy our thoughts for a few moments while gathered here to discuss the various phases and conditions of fruit culture.

Before proceeding to speak of methods of culture and improvement, indulge me a little in a few preliminary remarks concerning some old orchards in my own immediate neighborhood,—orchards which were once large, thrifty and highly productive, but which are now partially dead, and whose remnants are rapidly going to decay; orchards, from whose limited history in age, location and manner of treatment we may gather a few hints to guide us in our search after truth. But these are not isolated cases; there are hundreds, and perhaps thousands of old and dying-out orchards, to-day, all over our State, some of them so far gone that of many of the trees it may be said, as we would say of an old and decayed tooth, "it had better be pulled out root and branch and a new one substituted, for that is the only way in which that tooth can be renovated."

I remember well some of the grand old orchards of my childhood's days; there was something enchanting and enticing about them, and to my mind there are no trees now that grow so tall, that lift their heads so majestically, or that wave so gracefully in the autumn breezes, and that are loaded so richly and heavily with golden, yellow and crimson fruit. The trees then were in some measure, at least, as nature designed and formed them, and the fruit as God made it, and I have often thought that no apples since have tasted half so sweet and good. It may be because, having no orchard of our own, that they were sometimes surreptitiously obtained, as Eve obtained hers. That was more than thirty-five years ago, and what changes have been effected since by heat and cold, by sunshine and storm, by depredations of insects and by the hand of man. It is truly astonishing, these wonderful changes; often we cannot understand or realize them.

Within a radius of five or six miles, there existed in those days six or seven large orchards, renowned throughout the State for their good fruit and great productiveness. The most famous of these were Dr. Vaughan's and that of Mr. Haskell. The others embraced the orchards of Major Haines, Mr. Frank Wingate, Mr. Joseph Wingate, and that of Dr. Weld, original owner Mr. Carr, I think. I have been informed, from reliable authority, that none of these orchards date their existence farther back than 1800. They were all set out about the same time. Some in 1804, some a little later, and possibly some a little earlier; so that to-day none of them can be much over 75 years of age. I had supposed they were older. But taking this statement as true, what is the condition of these orchards as they now exist? What are they producing? What do they promise for the future? What are the facts in the case?

The orchard, or rather orchards of Dr. Vaughan, originally consisted of forty acres, in two fields of twenty acres each. One of these fields is situated at a short distance from the buildings, in a southeasterly direction, and on the south side of the road; more than one-half of this field, the eastern half, is elevated land and faces the west and northwest; it has been plowed and under cultivation several times during the past thirty years, but from some cause nearly every tree is dead and gone. The other and lesser half is lower land and consequently more protected; it is also moister land, and being rocky it has not been plowed much, if any, and on this portion I noticed a good many trees still standing; I did not go into this orchard or count them, but should judge there might be 150 or 200 trees.

In the other field, which in reality consists of two, one of about 17 acres and the other of about 3 acres, I took more pains to notice the number of trees left, and their condition. In the large field I counted just 150 trees, such as they were. They were evidently past renovation; at any rate, I would not waste much time or money on them. The land is naturally adapted to orcharding, and it must have been protected throughout nearly the whole of its existence by forests on the north and west. I was told by the present proprietors, that it had been plowed only once during the past 25 or 30 years. The smaller orchard of three acres lies under and has the protection of a hill, and is exposed to the full burning rays of the sun. Notwithstanding this, the most of the trees are remaining, but few having died; I counted one hundred. They need pruning, and the land needs to be improved. If something is done soon, the orchard will be good for ten years and bear considerable fruit. I was told that twenty years ago, people remarked that the orchard would not last much longer; it was badly run down, and the land full of foul weeds; they bought a few sheep and put in, and the effect was so good they bought more and turned them in, and the land had been pastured to sheep more or less ever since. After commencing to pasture with sheep, a great change for the better came over the orchard. The trees were healthier, and there was more and better fruit.

But let us glance for a moment at another orchard no less famous; in fact, in some respects more renowned than the other. I have been informed quite recently, that it was once considered, by everybody acquainted with it, as one of the most productive and remunerative orchards in that vicinity. I refer to the old Hesketh orchard. It occupied a prominent position on the eastern slope of a very high hill. The majority of it was grafted, and consisted of the old standard varieties—Russets, Baldwins, Bellflowers, Greenings, Franklin Sweet, Talman Sweet, English Summer Pearmain, and others. The larger part of this orchard is still standing, though in reality but a mere wreck of its former pride and glory. Recently, one hundred of the trees have been cut down, and one hundred more, they say, ought to be served in the same way. There are probably from 150 to 200 trees still worth saving, and which by good nursing and liberal treatment may be preserved some time yet, and made to bear fruit with profit. One of the treatments given this orchard by a former proprietor, must not be passed by unnoticed. It was undoubtedly one of the causes of its great productiveness. It was this: He kept the orchard under constant cultivation, always sowing and raising oats; after the oats were off he would plow the stubble under and dress the land with manure purchased in the city, preferring to keep that made on the farm for field crops. Was not here the secret of his success? Not in the particular manure used, but in the constant cultivation and constant replenishing, so different from the spasmodic efforts with which we are too often afflicted? And may not this rapid and disastrous deterioration of the orchard be attributable, in great measure, at least, to an entirely different manner of treatment, whereby the land was seeded down and no after cultivation or replenishing done for several years?

Of the orchard once owned by Dr. Weld (originally owned and planted by Mr. Carr, I suppose), not much can be said. Of about sixty trees left standing, forty of them certainly ought to be pulled out root and branch. I think it has been plowed and cultivated considerably at long intervals.

It would not be worth while to make mention of the orchard formerly owned by Mr. Joseph Wingate, were it not for two or three facts worthy of note. The majority of the orchard is planted upon the side of a hill, the entire slope of which faces the east, and consequently not exposed to the coldest winds. The oldest trees have outlived the youngest, which were planted on the top of the hill. A portion of the orchard has not been plowed at all, or at least but seldom, and it is in better condition to-day than that which has been plowed and cultivated. The reason of this probably lies in the fact that the land is richer and contains more moisture, and that it receives the wash of the higher land and in some parts the wash from the barn-yard.

I now come to the farm once owned by Major Haines. He distinctly remembers that his grandfather came on to the place in about 1765. He said the first orchard set out was in a field of about three acres, a little northwest of the buildings. It must have contained once from 150 to 200 trees. Only about twenty are left standing. We cut down a number of them ourselves long before they were dead, because the fruit was worthless. But the Major, in conversation, has often referred to the orchard as being one of the most flourishing and productive in the neighborhood. He said they used to make eighty barrels of cider from that one orchard. Some of the trees must have lived to be more than a century old.

Downing tells us of two famous old trees which lived to be 140 years old, and bore that year, together, thirty or forty bushels of apples, and the following year they bore 101 bushels. He does not tell us how much longer they lived.

On the south side of the road, opposite the buildings, another orchard was planted later, as also some about the buildings, and rows by the road-side as far as the line of the farm extended to the east. We moved on to this farm thirty-three years ago. The orchard then was in its prime. It was very flourishing and productive, some of the Baldwin and Russet trees producing seven and eight barrels of first quality fruit. There is yet living and in fair condition, one large Russet tree, which the former proprietor, Mr. Thing, informed us bore thirteen barrels of nice Russets in one season. A small portion of this farm was owned by the widow Haines at the time of purchase by my father; it included a few acres of pasturage, and one acre and a half of orcharding, a part of which was grafted fruit. None of the former proprietors had been able to buy her out; she clung tenaciously to her thirds. All that she did to her part was to draw her annual salary, which consisted of a small amount of hay and a few barrels of apples. Year by year the hay diminished, and the apples grew less in amount, until she was glad to sell out.

When it came into our possession it was in a sadly neglected condition. The land had grown up mostly to golden rod and other weeds, and the trees were in a shameful state. The first thing my father did was to prune the orchard, and the second to plow the ground and till it, but that was so long ago that I do not remember the precise effect it had, only that there was a general improvement. However, a few years later my brother and myself had occasion to plow up the same ground; we planted to potatoes, putting on a good coating of manure. I remember the effect the manuring and cultivating had at that time, there was a decided improvement; the trees came out the following year with a much darker and richer color to the foliage, and the fruit was larger and of better quality. I have a distinct recollection of the effect on one tree in particular, because we gave it a double dose of dressing, that is, put around it a whole cartload of manure. We did this on account of our partiality for the fruit, although only a seedling variety. The effect was almost marvellous. The apples grew to twice if not to three times their former size; and they were very much richer in flavor; and, whereas there was no market for them before, always going for cider, now there was a ready market for them; we sent in one year from that one tree, four or five barrels of nice fruit to Bath, as a good fall eating apple. They were so good that we might have introduced the apple as a new variety, and named it Atherton's Seedling, or Atherton's Favorite, just as some apples are named Williams' Favorite or Smith's Favorite, or Aunt Hannah's Best. One portion of our orchard has never been plowed. It has always been kept in good heart, partly from an annual wash from the barn-yard and road-side, and partly from top-dressings, and has always done well.

But I must not dwell at too great length on this part of my subject. It would be interesting could those old worthies arise from their graves and give us a personal history of their experience in planting and rearing these orchards. But they cannot, and we must be contented to glean a little here and there and apply it to our own times, either as an example worthy to follow or as a danger to avoid.

RENOVATION.

What, then, must we do to preserve our old orchards, and not only to preserve, but also to put new life and power and productiveness into them?

The very first thing to be considered is, the age and condition of the orchard. Is it on the last decline of life? Has it become so enfeebled by disease, by natural decay, and by the severities of climate that it will not pay to expend time and money upon it? If so, you ought to know what to do at once. To preserve the old elm on Boston common as long as possible, was a grand and patriotic idea. To stay up its broken and shattered limbs, to guard its decayed and feeble trunk from the ravages of storms and relic hunters, was a work of love and duty, and no one begrudged the time and money required. But to try to renovate these old, broken down and worthless orchards of ours, that are on their last legs, to preserve these old stubs or scrubs of trees, because they were once fruitful, and because they are dear to us from past associations, is quite another thing. It cannot be the part of wisdom to spend time and money upon them. They had better be exterminated at once, root and branch, and new trees set in their places. Any orchard that is past 75 or 80 years of age, is beyond permanent renovation; it can only be nursed and bolstered up, and at best is a doubtful experiment; of course there may be exceptional cases. Any orchard between 40 and 50 years of age, will need and ought to have all the care we can possibly bestow upon it, and all the food material its condition requires. Any orchard past fifty years of age has begun to decline, and the rapidity of this decline may be lessened by constant replenishing; moreover, it will tend to keep the trees fruitful and from dying prematurely.

Having, then, settled the question of age and condition of the orchard, and determined the fact that something must be done to improve and replenish, we come to the question What must be done, and what is the best method to be pursued? There are a good many ways, but so much depends upon location, age and condition, character of the soil, means of obtaining fertilizers, and many other things, that it is almost impossible to lay down rules that shall be a criterion for all to follow. No cut-and-dried process will answer here. But, a few general principles may be laid down which will be safe to follow. First, we must prune our old orchards more frequently, and judiciously; and by this I mean, we must make it an inflexible rule never to allow any suckers or shoots to grow up about the trunks of the trees, and which disfigure so many orchards, and to remove all suckers and dead limbs as soon as they appear. Secondly, we must apply barn-yard manure or some other fertilizing matter to the soil more frequently, either as a top-dressing or plowed under.

In too many instances, it is neglect that is causing our old orchards to decay so rapidly, and in their renovation and improvement there are three general methods to be adopted. The first is, by the application of manure, lime or ashes to the surface as a top-dressing; the second, by plowing and working manure into the soil; and the third by grazing, either with sheep, swine or cattle.

Let us consider the first method. It is unquestionably the most natural one; a method in perfect harmony with the laws and provisions of nature. Our forests are annually mulched and top-dressed with decayed wood, leaves and plants, which decomposing and uniting with the soil, furnish a constant supply of nourishment. From an experience of several years in practical experiments in this direction, I am thoroughly convinced that if rightly applied it is beneficial. From actual tests, also, that it is better to apply our fertilizers, of whatever character, in a fine state, and annually or bi-annually, rather than at long intervals. That it is detrimental to our orchards to neglect them for several years, and then to apply a heavy coat of manure as a top-dressing. The reaction which is almost sure to follow any good effects, is quite serious. Moreover, top-dressing must not be relied on solely. In time the land will become hide-bound, so to speak, and then a change must follow; but a change of treatment should be made before such a necessity arises. Just as our bodies need a change of diet, so does an orchard, and the land must be in condition to receive proper nourishment or much of it will be lost; just as our bodies must be in a normal or healthy condition in order to appropriate and assimilate the food designed for them.

GRAZING OLD ORCHARDS TO IMPROVE THEM.

Let us look at it candidly for a moment, without partiality, without prejudice, and without bitterness. Every farmer will acknowledge, I think, that one of the easiest and cheapest, and laziest, of methods of renovation, is by sheep grazing; and at the same time he will own that it is one of the most careless and slovenly methods. Undoubtedly it is beneficial to a certain extent, and many old orchards have been reinvigorated and made to live longer and to bear more fruit, but too much reliance is generally placed upon this method. No matter how large the orchard, or how much worn out the land may be, a few sheep are turned in annually, and they are expected or supposed to do the whole work of renovation. At least, I should suppose so from the condition of several which I have observed during the past year or two. They are supposed to do all the pruning and mulching, and replenishing of fertilizers. One of the most famous old orchards in Kennebec county, which I passed recently, was in a terribly shameful condition, because the poor sheep did not do their whole duty, or supposed duty. I think that under certain circumstances, sheep-grazing may be made to be one of the most economical and profitable methods; but, as in the case of top-dressing, the land will need to be plowed and re-seeded once in awhile, as also an occasional extra application of manure, ashes and lime, in order to furnish an abundant crop of rich and sweet grass for the sheep. I have known orchards to be brought to and made to bear heavy crops, by turning in swine, but it is not a very cleanly or pleasant method.

PLOWING OLD ORCHARDS AS A MEANS OF RENOVATION.

This is the last method that will be considered in this paper—already too long—and I am beginning to think that it is, par excellence, the best method. And why? Because by constantly stirring the soil it is brought into that perfectly healthy state whereby its proper food being received, is more rapidly digested and assimilated. Moreover, it is more subject and sensitive to all atmospheric influences, and to the genial warmth of the sun, and more readily absorbs and retains moisture. Consequently, the roots and fibres of the trees extend out farther and down deeper, drawing nourishment from sources unattainable by other methods. But a great deal depends upon how the land is plowed, and when it is plowed. I would not trust a green hand; either employ an experienced man, or take the plow yourself. Do not plow deep at first, and more especially under the trees, and work the soil a little deeper each succeeding year, until satisfied that you are deep enough; in time you will have a deep, rich, mellow soil, and that is what you want for fruit trees.

One of the most healthy and productive fruit gardens of which I have any knowledge, is that of Mr. Calvin Spaulding of Hallowell. The trees consist of the apple, plum and pear, some of them quite old. The only dressing is a yearly application of horse manure, spread on in the spring and spaded in. On the land he raises a large amount of garden stuff, such as early peas, early potatoes, squashes, sweet corn, currants, strawberries and grapes, while the trees are always heavily loaded with fruit.

Lies not here the very foundation of all success—the yearly application of manure, though of but one kind, and the constant stirring of the soil? Can there not be some lesson drawn for us out of all these facts? And would it not be well for us, at least those of us who have old orchards, to plow and cultivate them? Cultivate them just as we would a field of corn or potatoes; apply, yearly, a dressing of manure, and occasionally one of lime and ashes. Prune them more frequently. Scrape off the rough bark early in the spring on wet days, and wash the limbs and trunks in a strong solution of soap or potash.

This ought to be a work of love and duty. "Freely ye have received, freely give," may be applied to temporal as well as spiritual blessings. He who robs his orchard, either in money, labor, or dressing, eventually defrauds himself. The work of renovating and replenishing our orchards may be a gigantic one, but our faith should also be gigantic. If we would see the land flowing with milk and honey, and the trees burdened with fruit, we must combine the highest intelligence of the mind with the wisest application of the plow. Theory and practice must go hand in hand.

Alfred Smith, of Monmouth, was next called upon, and read a paper on the same subject, with the following introductory remarks:

"I was much interested in the hearty welcome extended to the Society last evening by Mr. Torsey, in behalf of the citizens of this good old town of Winthrop. And I am happy to meet so many of my old associates with whom I first started in life. It was in this town that I had my birth, and my feelings often find expression in the words of the poet:

> "How dear to my heart are the scenes of my childhood!
> * * The orchard, the meadow * *
> And every loved spot that my infancy knew."

It was in an orchard of seven acres, in this town, that I caught the pomological brain fever, when a child of nine years, which has followed me ever since, and I expect will follow me till I pass over to the *other side*, where men emerge 'angels from their clay,' and are permitted to eat the fruit of the 'tree of life that stands in the midst of the Paradise of God.'"

ON THE MEANS NECESSARY TO PERMANENTLY RESTORE THE PRODUCTIVENESS OF OUR ORCHARDS.

By Alfred Smith, Monmouth.

Now, that we see the sad decline in our orchards and their products, and feel the necessity for renewed efforts to restore them to their original productiveness, the inquiry arises: What means are available, if any, to this end? The answer is—*intense, persistent culture*, applied yearly to our trees and orchards. It is evident, that comparatively few have acted on this principle, while the majority have left their orchards to struggle with the grass, and have even robbed them of that, which should have remained for mulching. It is also evident that they cannot compete with the grass and its thousands of rootlets, getting the best of the elements of plant food in early summer, leaving but a small portion for the trees. Therefore, such a course is nearly as disastrous to the growth and productiveness of our orchards, as the ravages of the caterpillars.

Now, then, if there is one formula of truth more apparent than another, it is this, that "whatsoever men sow, that shall they also reap." We, as pomologists and orchardists, are truly and surely reaping what we have sown. Those who have planted their fruit trees and orchards in suitable conditions, having all the necessary elements of plant food in yearly supply in the soil (the basis of all growth and fruit), and have persistently fought all pernicious insects, have gathered good harvests of apples, even during all the years of the prevalence of the caterpillars. I have been young, and now I am old, yet in all these years of experience have I never seen or known an apple tree or an orchard that refused to yield a yearly supply of fruit, if planted on suitable soil, having a favorable location, and careful treatment, (every tree, *the tree* cared for)—having every element of growth and fruit in yearly supply, and nothing to injure their physical condition.

Thus, this same truth is apparent, that we reap what we sow, in all the walks of life, and no less so in every branch and phase of agriculture. If we ask our Winthrop friends of the thorough-bred Jersey, how they obtain their gilt-edged butter, the reply is, "thought, enthusiasm, action; intense, persistent, intelligent feeding, thus making all the conditions in harmony with nature." Again, if we ask those interested in raising poultry, how they produce roosters that they say are worth from 50 to 150 dollars apiece, but relatively worth 50 cents,—or how they supply our markets with more bushels of eggs than farmers having orchards do bushels of apples, the reply will be, "good conditions; we reap what we sow."

Thus it is with the farmer who raises 100 or more bushels of corn, 400 bushels of potatoes, 600 of turnips, 600 of beets, or 200 bushels of strawberries per acre. We all understand how such products are obtained. We know it is done by care, thorough cultivation, and intelligent thought; by supplying the soil with elements suited to each plant, in sufficient quantity to produce the above results.

Again, if we ask the florist, or the lady who cultivates flowers, how they obtain such beautiful flowers, exciting such exquisite sensations of pleasure when presented to our view, and capable of calling forth that beautiful tribute of praise from our Lord, that "Solomon in all his glory was not arrayed like one of these,"—the reply will be, "we sow, plant and grow them in good conditions, such as their physical natures require."

Now then, must we, and shall we believe and act as though pomology were an exception to this never failing truth—that we reap what we sow—or are we so superstitious and stupid as to believe that Pomona (the goddess of fruit) is a respecter of persons, that she will give some, (her elect), beautiful orchards adorned with green foliage, and crimson and golden fruit, on which the eye rests with pleasure and delight, while to others having trees and orchards she gives nothing but pale leaves, interspersed with dead, unsightly branches? It is not so! There is no such god or goddess in the whole realm of nature. To all Pomona speaks in gentle accents, "make the conditions good, in harmony with my laws, care for and feed your trees and orchards with good food elements every year, in proportion to their size, age and ability to bear fruit; co-operate with your desires for fruit, and put your shoulders to the wheel, then come and offer at my shrine and I will help thee."

Now then, let no man attempt to plant and raise an orchard till he is ready to give his trees that care he knows to be requisite to produce an abundant crop of corn or potatoes. The apple and pear tree now must have care in all their stages of growth, from the planted seed to the mature tree, yielding its ten barrels of fruit.

Chemical science has developed the fact, that if you put enough plant food into good ordinary soil, to produce a certain crop, you can obtain that crop. If you put upon an acre enough plant food to produce one hundred bushels of corn, you can raise that amount. Then, of course, this truth holds good in raising fruit, as well—"we gather what we sow."

Mr. **Tinkham** of No. Monmouth. A number of years ago I got the idea that I could raise apples and sheep together. I have worked on that plan, and have succeeded very well. Of course, at first I made some failures, as every one will in commencing a new business. I got the idea that by fixing an acre of land and putting in four sheep, I could raise sheep without any considerable expense or labor; but I soon found out that the plan was a bad one,—that the sheep must have a living as well as the trees; and that the practice was simply robbing Peter to pay Paul. I changed my mode of operation. I said to myself, more sheep and more land. I never plowed a furrow in an orchard in my life, and I have done well. I raised sixty-five barrels of grafted fruit the last year. I have mulched considerably, but you cannot depend entirely upon that; it is an easy method of cultivation, and I must own that I like an easy way to do my work. Now a word in regard to setting trees. We read, and have been told that you must do your work in this respect "just so,"—you must hire a man and have him dig half a dozen holes in a day, and do it in a particular manner. When I hire a man to dig holes for trees, I want him to dig 30 or 40 of them in a day. I do not think a tree ought to be grafted the same year it is set. It ought to be let alone two or three years until it gets a good growth before grafting it. I used to have a great deal of trouble with scions dying. I think November is the time to cut them; then, if properly taken care of, you will have good, vigorous shoots from them. I would say a word on pruning trees. I do not think any two men ever agreed as to the proper time for pruning. I think from the 10th of August to the 10th of September is the proper time.

The **President**. We wish to hear from the next man who can tell us how to raise good fruit in such an unfavorable year as the last. We have him here, and I hope he will volunteer.

Mr. **Woodward**. You are mistaken in your man. I did not expect to be called upon. I will say that I cultivate my trees, and follow it up. I have practiced top-dressing considerably.

Mr. CARR. I think that heretofore we have not taken the care that we ought with our orchards. I have had quite good luck in raising fruit. The plate of Baldwins which I brought here this morning were taken from a barrel without any special effort to get the best,—right up from the top of the barrel. I also brought some Winthrop Greenings. Everybody knows that the last day of February is late for Winthrop Greenings, but I venture to say they will taste as fresh now as they would have tasted in October or November.

The PRESIDENT. I wish to inquire of Mr. Carr, if he has practised plowing his orchard?

ANSWER. I do sometimes.

Mr. FOSTER. I will ask Mr. Tinkham if he is troubled with borers where he pastures his orchard?

Mr. TINKHAM. I was troubled badly, but a copper wire and a good jackknife is enough for them.

Mr. CARR. How long does it take a borer to grow?

ANSWER. They develop in a very short time.

Mr. FLOYD. I defy any man to go over an orchard of 100 trees and get every borer the first time.

Mr. ATHERTON. I agree with Mr. Floyd. Let a man go through an orchard, I don't care how many times, some will escape his vigilance. I went over an orchard of 280 trees as faithfully as I knew how to, examining every tree, scraping the bark freely with the back of a knife, and some eluded me. I generally take with me a piece of wire. Hoop skirt wire is the best, I think.

Mr. ROBBINS. In regard to the borers, I think June, July, and even August and the first week of September, is the proper time to kill them.

Mr. Longfellow of Winthrop, was called upon for some remarks, and begged to be excused. Mr. Carr remarked that they (the Longfellows) had more apples in their cellar than all the rest of the orchardists of Winthrop, and enquired of Mr. Longfellow in regard to the number of barrels of fruit he had and the condition they were in.

Mr. LONGFELLOW. I have 150 barrels in the cellar, all russets. I don't know as there is anything I can say to interest you so well as others present.

QUESTION. How old are the trees?

ANSWER. Most of them are young—20 or 25 years old. Our old trees are run down, and do not amount to much at the present time. Most of our apples grow upon the young trees.

QUESTION. Are any of them in pasture land?

ANSWER. Most of them are in mowing fields. A few are in the pastures.

QUESTION. Do you top-dress considerably?

ANSWER. We top-dress mostly, although we mulch to a considerable extent.

QUESTION. Do you make a practice of applying the top-dressing under the branches, or further around?

ANSWER. As far as the branches extend.

Mr. FLOYD. There is one point of considerable importance in this connection, and Mr. Longfellow suggests it, and that is location. Mr. Longfellow has told us he raises the Roxbury Russets to a large extent. There are some soils where Roxbury Russets will grow well, and others where they will not. The soil of his farm is of copperas formation, and it is on that account, I think, that he has been so successful in orcharding. I have been familiar with the fact from my boyhood, that they raise good grapes and other fruits, but seem to be especially successful in Roxbury Russets. I think there is a ridge of land along the shore of the Cobbosseecontee that is particularly adapted to the raising of that fruit. Many years ago, at one point, they undertook to make copperas from these ledges, but gave it up after a short time. All along on these ledges apple trees flourish without any great effort. I do not think Mr. Longfellow has manured his land to an unusual extent. I have no doubt he has taken care of his trees, kept the borers out of them, etc., as every careful orchardist should do; but the great secret of his success is the location of his farm. I think it would not be proper for this Society to recommend Roxbury Russets for all parts of the State of Maine. They would not do well. I presented to-day a plate of Roxbury Russets that grew on this same soil in an old orchard, perhaps 75 years old, and more. It had been cropped year after year with grass and hardly any dressing carried back, and the trees have borne year after year until the orchard was about starved to death. There was one part of it that had received a little better care than the rest. I plowed it up and hauled on dressing, and those old trees revived and started into life almost instantly.

Mr. **Smith**. My experience has been, that we can't get *something* out of *nothing*, and there must be something to get an apple from. I raised apples in this town sometime ago, on soil similar to that which has been spoken of. There was iron in it to a considerable extent. I removed from Winthrop to Monmouth. Found an orchard there well grafted, but in a sad condition. I have told this a number of times. Well, I began to bring it up, and since that time I have raised apples there as handsome as any of these on exhibition, weighing nine ounces. It is a granite soil. What I was going to say is, that I think russets may be grown on most any soil, if you put in the proper elements. I find no trouble in raising good russets in Monmouth, and I think others can do the same.

Mr. **Howard**. I was in conversation with Mr. Longfellow sometime since, and I think he told me he could raise Roxbury Russets easier than he could Baldwins. Is that the case?

Mr. **Longfellow**. Yes, sir.

The **President**. We are admonished to take up other topics. Still, I think we have established this fact in the discussion, although briefly considered, that there is a necessity for a greater attention in the direction of fertility if we would produce bountiful crops. In regard to the different methods, we have not had such a variety of opinion as might have been desired.

The subject of the Russian apple business, and the paper promised us by Mr. Fernald of Harrison, has been allowed to lay upon the table until the present time. I notice Mr. Fernald is here, and I would inquire if he is ready to proceed with the consideration of that subject?

Mr. **Fernald.** I have to say, that I have written this paper quite hastily and under the pressure of a great deal of business, and there may be points connected with it which have not been properly considered. I will present it as it is, hoping it may be of some interest.

THE RUSSIAN APPLE BUSINESS.

By Granville Fernald, Harrison.

About a quarter of a century has passed since the first departure was taken in the practice of renewing or replacing the orchards which were first established in the country, by the introduction of nursery-grown trees from the West. In looking backward through this period, and making a practical estimate of the advantages to the State, derived from the importation of that kind of stock, I confess the aspect of things is discouraging. Probably a million of dollars, possibly several millions, have been paid out by the farmers of our State for apple trees from New York and other nurseries. Has this vast outlay of money been productive of suitable returns to the people of Maine? It may be there are a few orchards of these trees in the State which are paying a profit on the original investment, but of hundreds of orchards composed of tens of thousands of Western trees, set since they begun to be planted here, within the circuit of my acquaintance, I do not know of one that is in a condition of profitable bearing. You will find occasional trees of certain hardy kinds which produce fair crops of fruit, but as a rule the orchards of New York trees in a uniformly healthly and paying condition are very seldom to be found. I know of an orchard of about 100 trees, in the town where I reside, planted less than twenty years ago, of trees which were picked up by the road side or in the pasture and field; native, wild seedlings, grafted to Baldwins in the limbs or trunk when small, which has borne more good apples, and brought more money to the owner than all the New York apple trees I have ever seen.

Yet, with all these forbidding facts staring at us, there never has been, within the history of apple raising in the country, more anxious investigation of the subject of orcharding and the production of good apples than at the present time. At a period when in all the older States the orchards planted by the original settlers are showing unmistakable signs of being beyond the age of profitable fruit bearing, and are falling before the farmer's axe, or are being pulled up by the roots, and their venerable trunks and wide-spreading branches consumed by fire or hauled away to some by-spot to rot ingloriously, the demands of the country and the world at large, make it a question of great moment to the intelligent and aspiring farmer, whether he will plant new orchards to replace the old and dead ones, and supply the growing necessities for fine apples, or resort for a livelihood to other special courses of farming, or to growing a variety of products such as enter into the general wants of the country.

It will be readily admitted by all, that there is a genuine demand for large supplies of fruit trees to replenish or take the place of the exhausted and dying orchards of our State, and the facts implied in the brief glance I have taken at the history of the Western tree business here, will, I trust, be kept in mind, while I enter upon the discussion of a new departure in the history of apple tree planting.

About four years since, the tree agents commenced the sale of a new kind of apple trees under the name of "Russian." This title implied, and it was distinctly claimed, that the trees bearing that name had their origin in Russia in Europe, in high latitudes; and from this fact, they were supposed to have a greater degree of hardiness or ability to withstand the occasional extremes of cold and sudden change of temperature characteristic of our climate, so frequently fatal to all trees of tender constitution. The first named kinds which I remember to have seen were the Tetofsky and Pewaukee. Since the advent of these we have had quite a large list of trees introduced to notice as a class of hardy trees, which are claimed to be more valuable for our use than any of our native kinds. It is a fact that a determined effort has been made to establish the trade in and use of these varieties of trees at very high price. What has been the effect upon the propagation and planting of our best old sorts? Cotemporaneously with the introduction of the "Russians," old kinds began to be discarded. We were told it would not do to plant the old standard kinds; that they were not as hardy, and were destined to be superseded by the new kinds. The tree agents are not allowed to offer for sale more than two or three of the old famous sorts, as the R. I. Greening, Northern Spy, or Roxbury Russet, and say they cannot furnish standard trees at the former prices, at a profit; that the "Russians" are very costly to produce, and that the old standard kinds can be more profitably sold for fifteen cents each than the new kind for fifty cents. The average price for "Russian" trees for four years past has not been less than seventy-five cents by the dozen, though sometimes an agent will take almost any price rather than lose a sale. It is my opinion that the exorbitant prices charged for these trees had a tendency to discourage and dissuade many persons from purchasing at all, and that such prices are out of all proportion to the real cost or value of the trees to a great majority of our farmers. With this condition of the business in view, let us consider other well known facts, which are the direct consequence of the manner of prosecuting the trade by its numerous agents.

While the general interest in fruit cultivation is, as has been shown, greater than ever before, and while millions of dollars are being annually invested in the establishment of orchards, and great nurseries for supplying the increasing demands for good trees, there is evident a deep feeling of dissatisfaction with the manner of furnishing stock to orchardists for planting, a sense of being wronged, victimized, cheated. So intense is this feeling in many minds, that the dealers in fruit trees find it very difficult to operate profitably in many sections where they have sold trees very extensively.

heretofore. This feeling finds expression often in that cry which is one of the popular synonyms for deception or fraud, viz: "Humbug!" It is not confined to the ignorant man, who from lack of previous experience too late discovers he has been deceived, and vents his resentment in this common exclamation; but we hear it from the lips of the most intelligent men, who, viewing the tendency of the methods employed to effect large sales of trees, and the prospective influence it is calculated to have on the cause of pomology in the State, utter and repeat the cry more vehemently and with more earnestness of indignation than any other class. We hear it on all sides, from all classes of buyers. Men who have planted hundreds of trees only to see them die without ever beholding the color of their fruit, are crying "humbug," and cursing the "tree-peddlers." It comes from persons who never purchased a tree in their lives, and who are accustomed to echo the expressions and use second-hand the thoughts of others.

It is not surprising that such an opposition is manifested, and that ample causes exist, when we know the impelling inducements operating upon the tree agents under their engagements with those who employ them; not strange that the cry "humbug" is so often heard. Facts of every day occurrence prove that the agents for fruit stock are, on account of the adverse state of the tree business, obliged to resort to the most questionable methods to obtain orders for fruit stock. It is not considered sufficient or even essential that the tree agent shall be a man of gentlemanly manners and address, that he shall have had any previous experience in the business; that he shall have any knowledge of the art of tree culture, or of varieties or peculiar adaptation of soils or locations to certain kinds of trees. But he must be possessed of enough of the quality of stick-to-a-tive-ness to make sales of stock whether anybody wants it or not. He is expected to sell trees to men who do not want or need them. He *must sell*, and if he hasn't the "stick and hang" qualification he cannot succeed as a salesman.

Now, why does such a state of things exist? Does it not indicate a great wrong somewhere, and is it not a detriment to the pomological interests of our State, and a disgrace to such persons as have formerly supplied us with trees, that compulsory sales must be made at exorbitant prices in order to make it a paying business? that in default of effecting voluntary, bona fide contracts for the sale of trees, the unscrupulous agent is disposed to defraud his employer, and inflict a dastardly blow at the relations between the buyer and seller, which but for these contemptible tricks, these outrageous frauds of which many of the tree selling fraternity have been for years gulity, might have been amicable and satisfactory? A day or two since we read of an agent for a well known New York nursery firm being arrested and held to bail on a complaint for forging orders for trees amounting to $3,000, on which he was to receive 15 per cent. commission. This is only one of many cases of daring forgery of orders for fruit stock; which acts are some of the most aggravating causes of the present condition of the tree trade. I know of men who are considered successful agents in obtaining of orders, who have no scruples against using the most dishonest means to make sales of stock. One agent, operating in a certain section of the State, happened in the course of his canvass to call on a couple of elderly ladies who were employed in making husk mats. They wished to have some trees, but had not much money, and declined to order any. This agent, with the pertinacity for which he is distinguished, and the artfulness of a villian, seeing a chance to sell some trees, immediately replied, saying he would take his pay in anything; he would take husk mats. And he succeeded in assuring these women that he would deliver the trees himself at the appointed time, and would take his pay in the products of their hard handiwork. It is probable they are still at work getting ready to pay for their trees in the spring. We know what the result is likely to be,—a demand on these poor women for the money in payment of their order, and a revelation of the rascality of the agent to the man who hires him.

These abuses are not confined to our own section, but have been prevalent in all parts of the land wherever the foot of the tree agent has strayed.

Mr. C. W. Garfield, Secretary of the Michigan Agricultural College, in an address on the apple orchard, delivered before a farmers' institute in that State two years ago, said: "Trees should be purchased, if possible, at the nursery where they are grown, and the nearer home the better. Those who simply deal in trees are usually unprincipled men. In truth, the terms tree dealer and liar are getting to be interchangeable ones."

Mr. J. H. Putnam, of Grafton, Vt., in an essay on apple culture, delivered before the Board of Agriculture, Manufactures and Mining, of that State, shows how the omnipresent tree dealer was appreciated in that section two years ago. He says: "Let me not be understood as condemning the whole race of *tree peddlers*; they are not *all* of them necessarily unmitigated scoundrels. A man may travel about the country selling trees and at the same time be honest, but it is an indisputable fact, that people have sometimes been woefully bitten. Selling a new, unproved variety of grapes at five dollars per plant, and furnishing a poor plant at that; selling the Tetofsky apple at one dollar per tree, and making folks believe the scion with which the tree was grafted came from Russia; selling people an endless variety of trees, many of which are in no wise adapted to the locality, and which with the best treatment will never prove profitable; promising to furnish first class trees; going to the large commercial nurseries of the West, and buying the refuse trees which the nursery-men will not send out themselves, and with these filling their orders,—these are a few of the sins of some tree agents, which the whole class are in a measure unjustly obliged to answer for."

The foregoing is a truthful and fair comment upon the class of abuses to which I have at some length referred, and will be endorsed by all who know the ways of the tree dealing profession.

Having pretty clearly stated my belief respecting the transactions of the travelling tree agents, it may be in order to inquire whether any responsibility for the frauds committed against the purchasers of fruit stock, justly attaches to the nurserymen, who are engaged, with the employment of large amounts of capital and an army of men, in constantly pushing their operations in tree growing? I believe from the information I have gained of the character of our leading responsible nursery proprietors, that they are men of integrity in business matters, which distinction, coupled with their well known skill in the production of the most perfectly grown trees, precludes the idea that the charge of fraudulent dealing can justly lie against them. Besides, those who are familiar with the annals of pomology, know that many of the leading proprietors of fruit tree nurseries are not only striving actively for commanding success in their line of business, but that they are devoted largely to the object of promoting the ends of scientific inquisition into the causes of failure in the various branches of fruit culture, and in laboring for the building up of the fruit business by legitimate methods. It is evident, therefore, that the self-sacrificing labors of these men, and the aid to the cause of American Pomology contributed by them, are sufficient to place them above the shaft of condemnation which is aimed by those who profess to see nothing in the whole business of furnishing trees to the poor farmers but a big, wholesale humbug.

Neither do I believe that all the men who are the responsible contractors to furnish the farmers with nursery stock, and who are the employers of the numerous travelling tree agents, are morally answerable for the disappointment and damage suffered by those who are unfortunate in their dealings with the tree-vending itinerant. I know of only one of this class of dealers whose headquarters is in Maine, and I am convinced, from my knowledge of his methods of operation, that he is an upright business man, and is in all cases disposed to be just and liberal with his customers, and has been known to discharge sub-agents for dishonest dealing, whether it affected his own or his customers' interest. I know that he has for years furnished a good quality of stock—much better than the average brought here from the West, and it is a fact, that no large dealer in nursery trees in this State has given such general satisfaction to his customers as the one to whom I allude. But he cannot be cognizant of all their dealings, and of course many abuses are practised by the sub-agents of which he has no knowledge and for which he should not be blamed further than his responsibility is involved under the directions which he gives the selling agents for their general government in obtaining orders.

And now, in returning to the subject of the Russian apple, what, you ask, are my conclusions respecting it? During the investigation and research for facts, which I have given to it for many weeks past, I have found good reasons, I think, for some modification of the views and impressions I had previously entertained respecting the true character of the Russian apple tree, and the Russian apple mania. It is but natural that we distrust the methods and appliances by which we have been repeatedly deceived, and after an experience and observation of years of tree-buying and planting, with most unsatisfactory results, is it strange that we regard the efforts and the peculiar means employed to introduce new varieties of trees for sale, with somewhat of incredulity and apprehension? Although I have given the Russian apple trees a trial, and am watching their growth and development with much interest, I am not convinced that they are any more valuable to me, nor are they to any man whose location is favorable to the cultivation of our best old standard fruits. There are places in almost every town, where there is nearly every winter a degree of cold prevalent at certain times sufficient, if followed by a sudden change to warm weather, to kill almost any common kind of apple tree. For such locations the Russian apple trees are well adapted.

It must be remembered that of all the so-called hardy apple trees recently introduced and sold as "Russian," but two are known to be of Russian origin, viz: the Tetofsky and Emperor Alexander, which were imported by the elder Manning of Salem, Mass. The Pewaukee, which has been sold largely for a Russian, is a seedling of the Duchess of Oldenburg, and originated by Mr. George P. Peffer of Pewaukee, Wis. The Haas, Walbridge, and others now being largely sold as hardy, and represented by many agents as "Russian," are natives of this country, and are deserving of intelligent trial, and will prove for many places hardy enough for all seasons. They are generally in bearing while young, which is a valuable consideration in deciding what to purchase.

Dr. T. H. Hoskins, of Newport, Vt., a gentleman of great experience and extensive information on this subject, to whom I am indebted for valuable facts, writes me as follows: "There is no 'humbug' about the apples; they are all good sorts, and valuable where extreme hardiness is required. They would be promising for all the northern parts of your State. But there is a great deal of humbug used in the selling of those varieties by peddlers. I have them all in my orchard and in my nursery for sale at $25 per 100, yet the peddlers will sell them (or trees labelled with their names) all around me at $1 apiece. I know no way to prevent this, as long as the 'Fool-killer is so remiss in his duties.'" He adds: "I should not recommend any of these varieties for planting in those sections where older and well known sorts succeed. Even though as good, they would not sell as well, because unknown."

In concluding my discussion of the Russian apple business, I will say: these trees are yet to be further tested, and the fruits they bear must be better known before it would be advisable to invest largely in that kind of stock. If we can raise the Baldwin, the Greening, the Russet, the Northern Spy, the Bellflower and other well known kinds in abundance, I think they should not be discarded at the interested solicitations of a peregrinating ignoramus, who hardly knows an apple tree from a shad-bush.

While "humbug" is so naturally one of the subjects connected with this discussion, I deem it a duty to the cause of pomology to bring to your notice what I consider a more dangerous humbug even than anything chargeable to the Russian apple business. Within the last ten years, since the hardy kinds of crab apple trees have become well known, the impression has prevailed extensively that this kind of stock was the only reliable and safe thing in the apple line to plant, or that stocks and roots from the wild crab seed were more valuable upon which to propagate the finer varieties of apples, than stocks grown from seeds of common kinds of apples. This opinion, whether originating in the pretensions of interested tree-growers or not, I am unable to say, has nevertheless been sedulously fostered and encouraged by parties having or pretending to have large nurseries composed of trees grown on crab-roots; and by this means, and with the distinct understanding and agreement to furnish trees thus propagated, and which should be warranted to be more hardy, long-lived, productive, and as a matter of course, more profitable than any others, large sales of these trees have been made in this and other States, and in the adjoining Provinces, at prices much above the prevailing prices of the best standard apple trees of the most popular market varieties. I had an opportunity to converse with a man during the past autumn who is quite largely interested in growing apple trees for sale in our State, and is at the present time grafting large numbers of roots for planting next spring in this State, who claims that every tree he raises is grafted on a crab stock or root; that his trees are sure to be hardy, long-lived and productive; that by reason of using this kind of stocks, the trees are much more valuable for the orchardist than any trees whose roots are the offspring of any of our common apple seeds. He furthermore distinctly asserted, that all New York apple trees were grown on stock originating from common seeds taken from the pomace of the cider-mill, but that his trees were grown from wild crab apple seeds which cost him $300 per bushel!

Being assured that these trees were preferred in Northern Vermont and Canada before all others, and that no others were safe to plant, I have sought for further information on this subject, and will give the result of my inquiry by quoting from a letter from a perfectly reliable source. Says my correspondent: "The crab root, or stock, has no advantages over good stocks from seed of the common apple. We do not find our trees dying from root-killing, except in places where the ground is bare all winter. In such places, crab-roots are killed equally with the apple. The trees are no hardier on crab-roots, not so long-lived, and except with a few sorts, not so healthy. On such stock the fruit of many delicate varieties is apt to be of small size, and affected more or less in flavor. The "wild crab root" used by the nurseryman referred to by you, is simply the Siberian stock grown from seed of the crabs so abundant in this section. They are used for *cheapness*, and are puffed as of miraculous virtue, conferring hardiness, fruitfulness, and exemption from all diseases and all insects. All of which is a fraud, known to be such by those who practice it, and laughed at as a shrewd game to gull fools. I know of many orchards planted with these trees during the last 18 years. I regard them all as failures —the failure becoming more and more conspicuous as the trees get older. I began my own orchard, 11 years ago, with crab-grafted trees, but soon discarded them. I have now 700 trees in my orchard on free stocks, which are in every respect as thrifty as any growing in my native county of Kennebec. The crabs have perished, or are rapidly perishing. I am convinced that the Siberian, being naturally dwarf, does not furnish roots enough for the tree as it acquires size. They become scrubby, bear little, and that poor, and finally die at the age when a tree on apple roots is coming into full bearing. While the trees are small they grow well, and encourage hopes that are not fulfilled."

In speaking of the laudable efforts of this Society to warn the public against the fraudulent practices of tree agents from abroad, he further remarks: "The vast majority of 'scrub farmers' who never read at all, are the ones that make a market for the fraudulent tree agents. They are, in fact, victims of all sorts of frauds, and always will be. Every sort of villiany and quacking thrives on the ignorance of the people. The only remedy is to educate, educate, educate. They (the ignorant class) will always furnish abundant prey to the human hawks, wolves and hyenas who live by plundering and swindling."

Whatever I have said respecting the discouraging aspects of orcharding in consequence of the disastrous failures of western trees in this State, will, I trust, not cause any abatement of the present interest in the apple tree planting and culture. The orchardists of Maine have great inducements to persevere in their efforts to elevate the standard of their profession. Light and knowledge are taking the place of the gross ignorance of the past, and thoroughness in all processes of cultivation and general treatment of fruit trees, is succeeding in some measure the abuse and neglect of the orchards of former times. With the success attending the cultivation of the Russian and other hardy trees, there is hardly a spot in our State where good apples may not be raised, and every household be supplied to some extent with home-grown fruits.

Adjourned.

EVENING SESSION.

The PRESIDENT presented the following report on

THE NURSERY BUSINESS IN MAINE.

We have established the fact, based upon the opinions of prominent orchardists of the State, that we can produce here a stock of fruit trees, small fruits, vines, &c., in quantity and quality adequate to the demand.

It has been suggested that we should take measures to learn the amount of nursery business done in the State, and I have returns from a number of individuals and firms, in answer to a circular which I issued some time since, asking for reports from those engaged in the business, which I will read.

The first one is from N. R. Pike of Winthrop, who has eight or ten thousand apple trees, ready for market this spring. Every one who knows Mr. Pike, is aware that he is a reliable man, and that he will furnish trees such as he promises.

The next return I have is from Daniel Haines & Son of Parkman, who have a nursery of three acres, mostly grafted, containing about 30,000 trees.

Messrs. Perley & Perkins, South Vassalboro', have 20,000 apple and pear trees from two to four years old; also grape vines and other small fruits.

J. J. Towle, South Carthage, (nursery, I think, in Dixfield), 20,000 apple trees, and 1,000 grape vines, one-half of them suitable for sale.

Merrill & North, Wilton, nursery containing about 10,000 trees. "Have been in the business some time, and think our trees will prove as satisfactory as any in the State."

Jacob P. Smith, Cambridge, Somerset Co., 10,000 trees, not yet large enough for sale.

Bowman Brothers of North Sidney, have five acres of nursery stock, with 75,000 trees, about 6,000 of which are ready for market. They had very fine samples of their trees on exhibition at Waterville, last year.

E. G. Gordon of Solon, deals in small fruits, vines, &c.; also has a stock of nursery trees.

M. W. Reed, South Bridgton, Cumberland Co., says he has been in the business 35 years; keeps a general stock on hand for sale, of his own growing.

John Meade, North Bridgton, has a nursery stock of small fruits; has now on hand several hundred grape vines of his own raising, consisting of fifteen varieties. Can furnish them, he says, at lower prices than agents are now selling.

James A. Varney & Son, North Vassalboro', 40,000 apple trees, also a general stock of grape vines and smaller fruits; 30,000 trees ready for sale.

A. F. Severance, Nobleboro', has a stock, but does not say how large. James Millett of Warren, a small stock.

Mr. Hall of Auburn, has quite an extensive stock of very good fruit trees on hand. I regret much that I am obliged to report his nursery without any information concerning it, although my circular was issued in a Lewiston paper, and it seems to me that he ought to have reported.

Mrs. S. E. West of West Farmington, is engaged in the propagation of bulbs, plants, &c., for sale; not very extensively, but sufficient to supply a limited demand.

S. T. Whittier, Athens, residence in Cornville, 5,000 apple trees.

Moses Gilman, Sangerville, reports a stock of apple trees, without giving the number on hand or number ready for sale.

Daniel Partridge of Sandy Point, reports his address to me as a grower of plants, &c.

H. B. Williams, South China, reports a stock of 3,000 seedling apple trees, also an older nursery, from which he is making sales annually. Does not report the number.

These are the reports which have been received, and from them in figuring up I find they amount to 250,000 trees, in round numbers; from 100,000 to 150,000 of which are ready for market, consisting largely of seedling trees, but many grafted trees. I have knowledge of a large number of others, from whom no returns have been received, and I have no definite knowledge as to the number of trees under cultivation.

Mr. Smith of Monmouth. I did not report my trees, from the fact that you [the President] was there, and I showed them to you. We have about 3,000 seedling apple trees, and some grafted, and about 500 pear trees; besides grape vines and small fruits.

The President. Mr. Smith is here to report for himself. I knew he would be here, and consequently said nothing about his trees. There are many nurseries throughout the State, of which I have no definite knowledge. There is quite an extensive nursery at Mechanic Falls, which we do not care to add to our list.

Question. Why?

ANSWER. As long as they have not reported, it is not necessary to explain, and I think they do not have the real Maine grown trees.

QUESTION. That is a point I wish to ask. How many of these trees are brought from New York? It is said that many of the trees sold as Maine grown trees are brought here from New York, kept in a nursery a little while and then sold. Don't let us be cheated on our own ground.

The PRESIDENT. I think I can say safely, there are none of those trees which I have reported that are not Maine grown trees. The extensive nurseries which I have reported here I am certain are Maine grown trees, originating in the State, and from Maine seed.

QUESTION. All directly from the seed, do you understand?

ANSWER. I do.

Mr. FLOYD. The question suggests a fact to me, which I am almost ashamed to state. A few years ago a gentleman of West Waterville advertised in these parts that he had a lot of trees to sell, which were growing in his nursery, and he said they were native trees. I bought some of them and set them out, and in two years every one was dead. I found they all originated in New York. They were sent here and had survived one year.

The PRESIDENT. Have I reported his name?

ANSWER. I hope not.

Mr. CARR. I want to ask a question, and I ask it for information, to put people on their guard. We get cheated often, and sometimes in our nest, as you may call it. I understand there are many trees growing in Maine, to-day, in that way?

The PRESIDENT. No doubt of that. And so far as the chair is concerned, he has had intercourse enough with mankind to know that every man must look out for himself.

Mr. SMITH. On that ground it would be safer for everyone to buy seedling trees, and graft them when he gets ready. He can get scions from any source. It would be a safer course, I think.

Mr. ATHERTON. I am willing, for one, to take it for granted that the majority of these men who are raising seedling trees are reliable men.

The PRESIDENT. I think we may be sure that the most of those we have reported are men to be relied upon, and that they are originating their trees.

Mr. RICE. Asking questions seems to be in order, and I will ask if it is not as well to be cheated in our own nest as it is to be cheated by a foreign nest, and have the money go abroad?

The PRESIDENT. We have but little time to devote to the further consideration of this question. I think that from the figures which have been given me, that we may calculate we have some 500,000 good apple trees in the State, now growing; and of these there is something like 200,000 ready for market, and these will go a great way towards supplying this State with trees. It would retain a considerable amount of money among us, and you would be as likely to get as good results—I may say better—than by buying trees from abroad. Will Mr. Rice pursue this subject further?

Mr. RICE. I do not rise to address you at length. I suppose I am speaking to many who are better informed on this subject, perhaps, than I am. I consider that this nursery business in Maine lies at the base of all our prosperity in fruit growing. "As the twig is bent so is the tree inclined." As the tree gets started so will it grow. I would like to hear this matter treated candidly and fairly. I do not think we do well to harbor any ill-feelings towards any person engaged in a lawful trade, even if he is a tree vender. Everybody is free in this country. We cannot place any tariff upon trees from other States. It is on the basis of free trade. What are we going to do? We cannot say the New York and Western trees *shall not* be brought in here. It is but fair competition. There has been a tendency during these sessions to point out evils and neglect the remedy, that is, without suggesting a *practical* remedy. What we want is to point out the remedy. This subject has been fully ventilated.

In fact Mr. Fernald's paper treated the subject about as fairly and fully as it could be treated. I was pleased to listen to it. Every nurseryman can make money so far as he does it honestly and is right in it. We have no fault to find so far as they are honest, although it is exasperating sometimes to go home and learn a tree vender has been at your house and secured an order from some member of your family. There was a time when we were dependent more or less upon the Western States for fruit trees, but that time has passed, and the time has arrived for the declaration of independence in regard to the nursery business. The time has come when the State of Maine can stand upon its own basis. I think the remedy is, in the State of Maine growing her own stock. I have no doubt that among the persons mentioned in the report you can find plenty of reliable men of whom you can purchase trees as advantageously as from the Western or New York tree venders. I want to say a word in regard to the expense of buying these shrubs, vines and trees from other States. I presume it would surprise any man in this assembly if he could figure up the amount of money taken from the State of Maine for nursery stock in one year.

QUESTION. What do you estimate the amount?

ANSWER. I have no statistics.

Mr. ATHERTON. I think Mr. Rice was going to tell us the remedy to prevent our good people from sending so much money from the State. Now, it is a fact that we send a great deal of money from the State for corn. I think Mr. Boardman says $2,500,000 a year, and it is evident that we ought to raise more corn. I think the remedy for that is plain enough. It is so with wheat. We have been sending out of the State a large amount of money each year for our flour, and the only way is to raise more ourselves. That I think is the only remedy for us in regard to apple trees, for our own nurserymen to raise for us just as good trees, and in sufficient quantities, as can be raised out of the State, and furnish them to us at reasonable prices.

Mr. FERNALD. Perhaps I have said enough to day, but I would like to say a word or two on this subject. I treated the subject of the "Russian apple tree business," and subjects intimately connected with it, in as fair a light as I could under the circumstances. Having investigated the matter for some months past, and having obtained information from various sources, I felt impelled in justice to the people, to give them the result of my investigations. I do not think I have exaggerated anything. I am acquainted with many men in the apple tree business. Among them are some very good, honest, upright and reliable men, who pursue their business on strictly honest principles. I have known cases where some of this class of men have made good the losses which were occasioned by the mismanagement of their agents or by failures. I have had trees of some of these men which have done well.

Some say that in New York, in the vicinity of Rochester, and near Geneva, are the most favorable places for the growing of trees. They say the sudden changes we have here render it practically impossible for us to raise good trees. I do not consider this a good ground at all. I believe trees can be raised here in Maine, and that we ought to encourage Maine enterprise in this direction. I am glad to see so much interest shown in this matter.

THE PRESIDENT. We shall now be obliged to suspend the discussion of this subject, much as we would like to pursue it further, in order to devote a few moments before closing the session, to the subject of ferns and ferneries and the cultivation of flowers, in accordance with the announcement in the programme.

The SECRETARY. I wrote a few days ago to Mr. Vickery of Portland, a well known florist, and a member of the Society, asking for a brief paper for our meeting on some subject connected with floriculture, to fill a few moments. I have received in reply a paper which by permission I will read, regretting that Mr. Vickery is not here to speak for himself.

NOTES ON FERNS AND FLOWERS.

BY JAMES VICKERY, FLORIST, PORTLAND.

FERNS AND FERNERIES. Most of the ferns under cultivation are natives of warm countries, hence they require heat, proper drainage and suitable soil. The soil in which they do the best is leaf-mold composted with about one-fourth part fine sand. But the principal thing is to give them good drainage, whether in pots or in the fernery. In planting ferns in pots, put a piece of a broken pot in the bottom over the hole, and over this put some coarse materials, (siftings) before putting in the soil, and that will make a good drainage. Be sure to leave space on the top of the soil in the pot to hold water sufficient to wet the soil through. The heat they require is from 60 to 70 degrees, but some of them require fully 70 degrees. They should be kept from strong sun, but want plenty of light.

A great mistake is made in planting ferneries. Generally the pan is not deep enough to give a good drainage. The pan to grow good sized ferns should be from eight to ten inches deep. Put in the same soil as directed above. For drainage, cover the bottom with pieces of broken pots, and then a little charcoal, if convenient, but be sure and put in the siftings before the soil is put in, to secure a good drainage. When a fernery is first planted it should have a thorough watering to wet it through. They do not require watering often, because they cannot get dry the same as those in pots, for water cannot evaporate so fast. Many people think that a fernery should be air-tight, but this is a mistake; they do not require it.

Where do the ferns come from? They come from the wild forest, where all plants are collected from, where they all get a plenty of air, but are found in shady situations. As I said before, they do not like the bright sun in summer time, but in winter when the sunshine is weak it does not hurt them. Ferns like moisture and heat. Keeping a fernery air-tight does not hurt the ferns for a little while, but when the glass and ferns get wet they want air two or three times a week.

The best time to plant a fernery is in September, to get it well started before cold weather, and it will keep good a year, then it should be replanted and new soil put in.

THE CULTIVATION OF HOUSE PLANTS. The principal thing required is to give them the right treatment through the summer months, to make them bloom in the house during the winter. I will speak first of the geranium, which nearly every one has who keeps plants. The best soil for them is composed of well rotted sods, with one-third part of old barnyard manure, and a little sand, if convenient, all well mixed. Young plants are the best for flowering, and the way to get them is to make cuttings in June or July. Put each cutting separately in a small pot, with one-half soil and the other half sand, well mixed. Keep them in a shady situation for about six weeks, under a tree or bush or cold frame. Avoid exposing them to heavy rains, for if kept too wet they will decay. After they are well rooted put them in three inch pots in the soil above directed, and give them a plenty of sun. Then about the middle of September put them again in five inch pots and put them where they are to remain through the winter, and they will blossom all winter. In the spring plant these geraniums in a good flower garden and they will flower well all summer. But do not take them up in the fall. You will not need them, for you have a young stock to take their place. By following this course every year you will have good looking young plants and plenty of flowers the year round.

CALLA LILIES. To have them flower well through the winter they must rest through the summer. The last of May I put my lilies in the garden, and lay them down in their pots on one side to keep the rain from wetting them, so they will dry up. The leaves will soon get yellow, and the sap will go back in the bulb and strengthen it while it is resting. Keep them dry until the last of August or first of September, then take the bulb out of the pot, cut all the roots off close to the bulb, put in all new soil the same as for geraniums, and they will be sure to flower well through the winter. That is the way I treated my calla lilies last summer, and out of 130 pots I did not lose a single plant, and they have been blooming finely. Some of the strongest plants have had five and six flowers, and now it is only February, and they are looking finely, and likely to have as many more flowers by the last of May.

OTHER PLANTS. I will name a few more plants that will do well in dwelling houses through the winter. The Bouvardias are good winter flowering plants, but like the heat, and do the best at 70 degrees. There are five or six kinds, of different colors. There are the Begonias, three or four kinds, very good house plants for flowering, and will stand the dry heat of the room. The Chinese Primrose is a great bloomer, and will do well in any common room, either hot or cold, but not below 40 degrees. The Azalia is another good house plant, but must have the right treatment in order to have it bloom every year. It is a plant that will stand the heat or cold. The soil it requires is leaf mold, muck and sand. They do not bloom but once, but stay in bloom a long time. The principal requirement in order to have them bloom well is to keep them a little dry after they have made their growth, for that is the time the bulbs set for the next winter's flowering.

A great many ladies come in my green house and say, "Oh, I wish my plants looked like yours. It is the gas destroys them." But I do not think so. There is no gas escapes where it is burning. What the plants most generally want in dwelling houses is more moisture. Shower them more and keep the pores open. A great many people make a practice to water their plants every morning, and do water them whether they want it or not. That is not right. Too much water is as bad as not enough, especially in cold weather when they are growing flowers. Examine the pots before watering, and if not dry do not water, for if you keep a plant too wet all the time the soil will become sour, and the plant will stop growing and probably die.

Mr. Floyd. I regret exceedingly that there is no time to speak of the beautiful things God has made. I love these little flowers. I am aware it will not do to take up much time, so I will simply state the facts in regard to this little fernery which I have exhibited here. It is simply a tin dish; you can see its height. It is water tight. These are squares of glass cut in the usual way, and of the right proportions, and it is put together with mucilage and strips of paper.

The younger members of my family went into the woods and gathered a dozen different varieties of plants. They said they got them all on a piece of ground not more than two or three rods square, by the side of a little running brook, and they wanted to preserve some of them. There were four kinds of mosses, the partridge berry, and I don't know the names of all the kinds. They are here, and any one can see them. They should be ventillated and watered, for by keeping them too tight the moisture gathers on the glass which prevents one seeing the plants. There is nothing there for the plants to grow in except what was taken up with them in the forest. They were taken up in sections so as to disturb the roots as little as possible. I will not take up any more time. It is a pleasure to see them looking so fresh and green in the winter, and I would recommend others to try it. I think you will find yourselves fully repaid for your trouble.

The President. We are forcibly reminded by this little fernery and by the remarks of Mr. Floyd, how easy it is to prepare such a collection for our homes, and to interest our children in such matters, and how much pleasure they will take in procuring and preserving them. I wish we might pursue the subject further, but we are admonished by the lapse of time that we cannot do so.

I find in the question box here only two questions, and find upon them answers in a handwriting which proves that they are answered by one who is fully competent. I will read them.

Question. "What are the best five pears for a home collection in Central Maine?"

Answer. "Clapp's Favorite, Belle Lucrative, Duchess d' Angouleme, Beurre d' Anjou and Lawrence."

2d Question. "What are the best two varieties of grapes for Central Maine?"

Answer. "Either two of the following: Delaware, Salem, Wilder."

The following resolutions were presented and adopted:

"*Resolved*, That the thanks of the Society and audience are due to the several gentlemen who have presented essays and papers at this meeting."

"*Resolved*, That the thanks of the Society are hereby tendered to the Maine Central Railroad Company for the liberal reduction of fares to persons attending this meeting."

"*Resolved*, That the members of the State Pomological Society take pleasure in acknowledging their obligations to the Farmer's Club and people of Winthrop, for the kind and hearty welcome extended by them to the Society, for the ample facilities provided, and for their attendance upon and interest in our meetings."

On motion of Mr. Rice,

Voted, That the several papers and reports prepared for this meeting and not presented for want of time, be placed in the hands of the Secretary for publication in the annual report.

The PRESIDENT. We are now obliged to close the exercises of this convention, in order to accept an invitation to spend a short time in social intercourse at Grangers' Hall, which has been extended to the Society and its visiting friends. We thank you for your kind reception, for the help you have rendered, and the hospitalities you have so agreeably dispensed during our stay here. We hope to meet many of you again. Some have joined the Society, and we hope many others will enroll themselves as members and help us to carry forward the work in which we are laboring. I have no further remarks to make at this time.

In accordance with the invitation of the ladies and gentlemen connected with Winthrop Grange Patrons of Husbandry, the Society and guests repaired to the hall of that organization, where a generous collation was served, and the evening passed pleasantly, with speeches, music, and social amusements.

FRIDAY MORNING—Business Meeting.

The Society met pursuant to adjournment, the President in the chair.

The report of the committee on the fruit exhibited at this meeting was presented and accepted.

The Treasurer presented his report for the year ending December 31, 1877, which was received and referred to the Executive Committee.

The report of the Executive Committee was presented by the Secretary, and accepted.

The President announced a vacancy in the representation of the Society in the State Board of Agriculture, in consequence of the resignation of Mr. James A. Varney, and thereupon the Society proceeded to an election by ballot, and George B. Sawyer of Wiscasset was elected as a member of said Board.

Voted, That the several Trustees be requested to furnish to the Secretary reports from their respective counties for publication in the next annual report.

Voted, To choose one or more persons in each of the several counties, to be nominated by the members from such county, to act in conjunction with the Trustees as County Committees, whose duty shall be to collect such useful and interesting information in relation to the subject of fruit culture in their respective counties as may be in their power, and embody the same in an annual report to the Society.

And such committees were chosen as elsewhere appears in this report.

Voted, To appoint the following standing committees, viz:

On Nomenclature—Messrs. Henry McLaughlin, Charles S. Pope and Samuel Rolfe.

On Entomology—Messrs. C. H. Fernald, George E. Brackett and Lyman F. Abbott.

The time and place of holding the next annual exhibition was discussed, and it was

Voted, That the matter be referred to the Executive Committee.

Voted, To accept James Vick's offers of special premiums to amateur florists, to be awarded at the next annual exhibitions, with the thanks of the Society for the same. [These premiums are the same as those offered by him last year and awarded at the annual exhibition,—see page 18.]

Adjourned.

REPORT ON THE EXHIBITION OF FRUIT AT THE WINTER MEETING.

The Committee appointed at the Winter Meeting of the Maine State Pomological Society, held at Winthrop on the 27th and 28th days of February, 1878, to examine and report upon the fruit exhibited at said meeting, submit the following report:

J. Pope & Son of Manchester, exhibited eight varieties of apples, viz: Baldwin, Minister, Peck's Pleasant, King of Tompkins County, Canada Red, Mother, Talman's Sweet and Ladies' Sweet. The Baldwins, Peck's Pleasant, Ladies' Sweet and Canada Red, were fine specimens. The specimens of King of Tompkins County, although past their prime, were considered worthy of favorable mention.

Alfred Smith of Monmouth, exhibited eight varieties of apples, viz: Roxbury Russets, Hubbardston Nonsuch, Baldwin, Rhode Island Greening, Cooper's Market, Talman's Sweet and Jewett's Fine Red—all fair specimens. The last named, considering the season, was a fine apple, while the Hubbardstons were of superior merit. Cooper's Market was a fine appearing apple, but concerning its merits as a variety but little is at present known.

A. C. Carr of Winthrop, exhibited three plates of Baldwins, one plate of Rhode Island Greenings, and one plate of Winthrop Greenings, all of which were of remarkable size and symmetry, and of very attractive appearance.

L. K. Litchfield of Winthrop, exhibited two plates of Baldwins and one dish of Soulard Crabs, the latter of which were marked by the exhibitor as worthless.

Willard Lecroix of Winthrop, exhibited a fine dish of Black Oxfords.

S. T. Floyd of Winthrop, exhibited one dish of Roxbury Russets, considered as very good specimens.

A. W. Tinkham of Monmouth, exhibited one plate of Roxbury Russets of superior size and merit.

Mention should also be made of a very handsome basket of flowers exhibited by Miss L. M. Pope of Manchester, as also of a fernery shown by Mr. Floyd of Winthrop.

C. R. RICE,
W. P. ATHERTON, } *Committee.*
D. J. BRIGGS,

LOCAL REPORTS ON FRUIT GROWING IN 1877.

REPORT FROM ANDROSCOGGIN COUNTY.

SOUTH TURNER, March 11, 1878.

To the Secretary of the Maine Pomological Society:

The apple crop in Androscoggin County, the past year, was almost a failure, particularly in the northerly part of the county. There were a few orchards in the southern part that produced some very good fruit. The old orchards have been stripped of their foliage, the past few years, by the caterpillars, so extensively that they have almost lost their vitality. There have been quite a number of young orchards set out within the last few years, to take the place of the old ones. There have been quite a large number of pear trees set recently, and they are making a very good growth. Almost every one who raises any fruit, grows a few grapes, a very few of which are grown for markets, but constituting only a small percentage of what are needed to supply the home market. I think grape culture should be encouraged in this county as well as in some others. Plums and small fruits are but little cultivated, except strawberries, of which there are quite an amount grown.

I would say here that I believe every man, whether he be young or old, that has a piece of land suitable for orcharding, should plant some fruit trees, if he has not done so already, both as a luxury and for profit. If we can raise our own fruit, it will be a saving of many thousands of dollars, in cash, to the county.

The Pomological Society is creating quite an interest in fruit raising in this county, as well as in the State at large, and if we can keep up this it will do a vast amount of good.

The price of apples at the time of this writing is two dollars and twenty cents per bushel in Lewiston market.

Respectfully yours,

D. J. BRIGGS.

REPORT FROM WALDO COUNTY.

The season of 1877 was one of almost total failure of apples, and of only moderate production of other fruits. In the markets, to-day, oranges are as cheap as apples. This is something so unusual that it is worthy of note. Trees did not put forth as much bloom as usual, and have made only a medium growth, owing to the severe drouth. They have, however, a healthy, robust look, that assures us they have vigor enough for a large crop in the near future.

The caterpillars were not very numerous or troublesome. Their depredations were easily guarded against, and average vigilance would keep the orchards free from them. Borers and the codling moth are on the increase. In some sections the borers are so troublesome that large numbers of pear trees are being set in the place of apple trees. Bark lice do a great deal of damage, and many do not realize it, or realizing it do not know how, or take pains, to rid the trees of these parasites.

The hard times and a better knowledge of fruit trees, works against the tree agent's sales to a considerable degree. A few past years it has been crabs largely; now it is the "iron clad Russian." The wild goose plum had its day, but not its generation. It led its purchasers a mythical wild goose chase after plums, but in nine cases out of ten, with all petting and care, died of croup or catarrh before the first plum appeared. Cherries, warranted black-knot proof; pears, that would grow in spite of all ill-usage; grapes, with promise of larger berry, greater clusters, and superior earliness, have been sold and planted out, and had the stock been good, and true to the bill, and had the planter given it proper care, Waldo, to-day, would be shaded by orchards, dotted with vineyards, and variegated with fruit gardens. Ship-building would be stimulated and fostered by the demand of bottoms to carry the product of our fruit-bearing woods, and the surplus of our teeming fields. But this was not so to be, or at least is not so now.

The great want of Waldo County, to-day, in the Pomological line, is not more trees, but better orchardists; not better varieties, but better care; not more tree agents, but *more manure*. There is not one orchard in our knowledge over-fed. There is but few properly fed; and there are hundreds simply starving to death. One tree properly fed is worth a dozen starving. Land rich enough for corn may do to start an orchard upon, but will not do to keep it upon unless its fertility is kept up and gradually increased. Trees must grow. They must bear fruit. They do not cease growing when they begin to bear, hence the need of increased fertilization. Too many are afraid to manure their trees. It is well they should be, but there is no harm in manuring the ground they grow upon. It is hardly possible, in Maine, in Waldo county, at least, to hurt an orchard by manuring.

We should realize that a fruit tree, especially an apple tree, is not designed for an hour, or for a day, but for a hundred years. It is something to hand down from father to son, and to grandson. Then it is the part of wisdom to select a hardy. valuable variety; set only the best specimens of its type; carefully transplant it, with patience and common sense; prudently handle, and wisely manage it; feed it, protect, direct it by judicious pruning, and watch over it lest it receive damage from any source, and our tree will kindly respond. It will show its pedigree, its bringing up, its care. Such a tree will pay better than whole orchards we could name. This tree will have a green old age, an extended longevity, and if change comes at all, only for the better.

The culture of the grape is on the increase. There is more enquiry for early maturing, hardy kinds. Only a short time since and a vine in Waldo County was a rare sight; now a family that is destitute of one or more is rarer still. They are highly prized for preserving, as well as for dessert dish, or food for the convalescent. Their culture is becoming better understood. Those finely pruned vines in mathematically correct diagrams, frightened the common people. "Oh! I can never do it." It was thought to be the only way. A scientist and mathematician combined, was needed to carry it out to a nicety. That time has gone by. That humbug has exploded, and the common people can raise a few grapes now, every one of them, by planting their vine and caring for it only as they would their hop vine, or honeysuckle. If they do not get enormous bunches for exhibition, they get some fruit at less expense, which answers their turn.

Strawberries are cultivated in greater breadth year by year. It will be a long time yet before the local markets are supplied, There is a demand that grows faster than the strawberries, and this keeps up a remunerative price. Cranberries, also, are largely consumed, but as yet sparsely grown with us. We have excellent cranberry lands, and good cranberry lands are good for nothing else. The Lord never made anything that cannot be put to use, but he made some that have not been. We have some good cranberry plantations, but not the good many that we ought to have. The cranberries raised in some sections of the State, are hollow. This is not the case with those grown in this section.

The work of the Pomological Society is being felt in every part of the State, to which Waldo county is no exception. This work and the literature of the fruit growing of Maine, is not yet duly appreciated. No society, so far as my observation extends, has accomplished so much good in so short a time. But the work is just begun. It is but just mapped and planned. The campaign is but just opened. The brush is only just cleared away preparatory to a more useful planting. Light is beaming from the darkness in many places, which will increase, and eventually break forth into the full blaze of day.

J. W. LANG.

[Not having received the reports which were expected from the Trustees in the other counties, and it being impossible to make any further delay in the preparation of this part of the work, the Secretary avails himself of the following articles selected from the newspapers of the State in the autumn of 1877, giving a general review of the condition and prospects of fruit growing in the State.]

THE APPLE.

What wheat is among the cereals, it seems to us, the apple is among the fruits—the most important, the most useful, the most indispensable. Commercially, it is one of the most important products of the temperate zone, and from the ease with which it is grown, the period of time which it covers—compassing in the season of its usefulness almost the entire year in its green state, while the market is never without the dried product—and the ease with which it may be transported from one section of the country to another, it, more than any other fruit, contributes to the real wants of the human family, while adding largely to the commercial interests of the country.

When we experience, as we are doing this year, an almost utter failure of this important crop throughout New England, we are led to realize to a far greater extent than we could ever do in years of an abundant yield of apples, how great a loss it is to be deprived of them, and how useful a part they contribute in the household economy. To be deprived of them is to suffer the loss of one of the most essential elements of good living—a loss which nothing can really make up. They form an economical and very healthy article of diet; and when to be had at a cheap rate, furnish a means of subsistence that is unrivaled for economy and healthfulness. They require but little sweetening to make a good sauce; are excellent for pies; esteemed a luxury when baked, with the addition of a little sugar; and as a desert, or for the use of children at "all hours of the day," nothing can take their place. In short, the apple is the fruit for the people, and one never tires of green apples, apple pie, or apple sauce, any sooner than we tire of flour bread or biscuit and butter. It is true, we have the cranberry; but the cranberry is essentially an aristocratic fruit, requiring a large amount of sugar to render it palatable—and then we have all forms of canned fruits; but these in no way make up for the loss of the apple, and are not consumed to any great degree in its stead.

Throughout our State, and generally throughout New England, the apple crop this year is very nearly a complete failure. For this there are some easily understood causes. To begin with, it is not, generally, a bearing year. Then, again, in most sections of our State the trees have been so ravaged by caterpillars during the past three years, that it has taken all their vitality to maintain life, to say nothing of the accumulation of force with which to give a crop of fruit. Farmers who have in past years derived a handsome revenue from the sale of apples, must be content to get nothing from this source the present fall—a loss which will be as sorely felt by some, as the absence of the fruit will be to others. And it is a question worth considering, if we should not find it profitable to put on, as many good orchardists did in past years, a sufficient force of workmen to keep the caterpillars in check, should they ever come in force again; and to so heavily manure our trees that they may bear every year whether the year be "odd" or "even." Cannot this be done?—*Maine Farmer.*

FRUIT-RAISING IN MAINE.

Fruit-raising in Maine, during the past few years, has been on the decline. There are probably twenty-five per cent. less apple trees in bearing condition now than there were three years ago. The ravages of the caterpillars cut off the apple crop two years, and left the trees in such an enfeebled state that the crop this year is the same as a failure. Large numbers of trees having been killied by the effects of the ravages of the caterpillars, farmers have been disinclined to purchase young trees for setting new orchards. Their old orchards, they have seen to be unprofitable and barren for three years, and they are not certain that it is going to be a good thing for them to set more orchards.

Fruit-raising in Maine should take a "new departure," and assume the importance which its merits deserve. No other branch of farming can be made to pay the large and continued profits that fruit-raising can be made to yield. An orchard of young, thrifty and productive apple trees is the best investment that any farmer can make. If a man owns a good orchard and takes care of it, he is as sure of a good crop every year as he is of a crop of corn or potatoes. Even during the past three years, those who have taken good care of their orchards have received remunerative crops of fruit from them. Those who protected their trees from caterpillars in 1875 and 1876, harvested good crops of fruit, of four times the value of what it had cost to protect the trees, and this year they will also harvest a fair crop, and the high prices will make it a very valuable one.

The experience of the past three years, however disheartening it has been to those who failed to protect their orchards from the caterpillars, has been full of encouragement to those who have protected the trees. They have learned that the apple crop is a sure crop if well cared for. Those who have taken the best care of their orchards have secured the greatest profit from them.

In caring for an orchard, it is not sufficient to keep off insect enemies. Something more is required. It is true that orchards will produce in ordinary years some fruit—often quite a fair quantity—but with very little attention other than to gather the fruit when ripe. The fact that apple trees do sometimes succeed remarkably well thus neglected, should be a basis for encouragement in adopting a better system of culture. No other producing agent on the farm responds more generously to good culture than does the apple tree. Yet no other farm crop is so generally left to look out for itself.

Fertilizers and farm manure are as essential to the best results in apple-raising as in corn-raising. Land that is in good condition will produce a little corn without manure, and so will an orchard without fertilizers, produce a little fruit. A heavy application of manure and fertilizers to the corn-field produces a large crop of grain, and pays a handsome profit on the expense.. So the application of manures and fertilizers to the orchard produces an abundant crop of large, fair apples which will sell at a good price. If the trees are fertilized every year, they will bear a pretty good crop of apples every year. The income of a large orchard of grafted fruit well cared for, proves one of the most reliable of any crop on the farm, and is one of the most substantial supports of the farmer. There are many orchards in this State, that previous to 1875 yearly brought more money to their owners than all the rest of the farm.

It is not recommended that every farmer should engage in apple growing. Some farms are ill adapted to apple trees, and it would prove uncertain business at the best, to attempt to raise them to any extent. Other farms, however, seem peculiarly well adapted to the apple tree. The trees grow thriftily, and are hardy and productive. Oftentimes such farms are stony and worth very little for other purposes except grazing. The farmer who owns such land should make orcharding his principal business. The apple crop should be his principal crop, and he should apply his manure and fertilizer to secure an abundant yield. In some towns in Maine, most of the high land is eminently well adapted to apple orchards, and the owners of such land should engage extensively in the culture of the apple. One man can attend to a large number of apple trees, covering several acres, except when the harvest time comes, when, of course, more laborers will be required. But, at other seasons of the year, the farmer could attend to his orchard himself, without the aid of the hired help, which would be needed if he cultivated hoed crops extensively.

Some refrain from setting young orchards, because they think it will require almost a lifetime for the trees to come into bearing. Much less time than is usually supposed is required to bring young trees into bearing. Trees set on suitable land, in good condition, cultivated, manured and well attended to, will be in condition in ten years to begin to bear considerably, and be a source of profit. Ten years is not a very long time to wait for a return for the money expended, and besides, he who plants an orchard, makes one of the best of investments for his children. It is a better investment than town or city bonds.

It is to be hoped that apple trees will be more extensively set the coming year than ever before, and that the farmers will cultivate the ground where the trees are set till they are well established in bearing. It is of very little use to set trees and neglect them. It is of little use to set trees from rich nurseries in poor grass fields where they cannot find enough nourishment to keep them alive. Trees in cultivated ground, where they are well fertilized will grow twice as much as in grass ground where they find deficient nourishment. Maine can produce as fine apples as can be grown on the continent, and can compete with any section in raising them. The numerous manufacturing towns and cities within her borders, and the cities and towns in New England, afford a ready market for all the apples that can be produced within our State. Let the farmers take a new interest in the culture of the apple and engage extensively in it. It is one of the most important branches of farming, and might be made the most profitable of any.—*Lewiston Journal.*

LOCAL REPORT FROM CUMBERLAND COUNTY.

STANDISH, September 12, 1877.

Fruit raising in this town is increasing, and is the best paying interest in soil tilling operations with us. Every man owning land, varying from one acre to one hundred and more, raises more or less apples and other fruit. There are some splendid and extensive orchards, raising apples of unsurpassed variety and excellence. The two best and most extensive fruit raising establishments in town, and perhaps in the county, belong respectively to Mr. A. W. Marrett and Rev. T. Baker. Mr. Marrett often counts his bushels of splendid Baldwins, and other choice kinds, up to 3,000,—from which he gathers a handsome income, in Portland, only fifteen miles from where they reddened and ripened in the autumn sun. Mr. Baker's orchard is younger, and consequently not of so large present productive capacity, but yet yielding him handsome returns, and promising vastly increased installments for his labor and care at a near future day. Besides an old orchard of several hundred trees, he has somewhere about 400 young ones, vigorous and thrifty, which he has planted, grafted and cared for, from the seed-bed, since he came upon the place, twenty years ago. Two hundred of these young trees have been several years in bearing, and last year yielded a good income. The rest are nearly all grafted, and promising a rich return for all labor and care in a very few years. He has a farm of 114 acres, that defies competition for capabilities in hay, grain, corn, and fruit raising, besides pine timber and wood growth, handy and in large supply. Pears, grapes, and other small fruits flourish and ripen well on his place.

The caterpillars, so destructive to orchards in other parts of the State, have done us no harm in Standish. For some reason, perhaps past explanation, the fruit is this year less in amount than even the ordinary crop of the unproductive years, and not an eighth of what it was last year.—*Cor. Lewiston Journal.*

FRUIT GROWING IN MAINE.

The ably written articles on fruit culture which have appeared in the *Farmer* of late, have been read with deep interest. Much capital has been and is still being invested in this branch of farming, while the returns for a few years past have been rather slow and uncertain, and the present outlook is far from encouraging. While these failures are so frequent around us, we need the views of the most experienced orchardists in the State concerning the cause. Let us hear from them; whether they have made the business pay or otherwise; their notes of warning or encouragement will be valuable to those who desire instruction.

A glance at the orchards over the State shows that the business has been both overdone and but half done. If but one half the money paid out yearly for trees, could be expended for *good trees* only, of those varieties proved to be adapted to the locality where they are set, and receive the same attention and cost of culture that the whole are now receiving, large losses and disappointments would be avoided. Perhaps no State in the Union has a greater variety of soil than ours—portions being well fitted for orcharding. and others valueless for this purpose. One has only to contrast the size, vigor and productiveness of both apple and pear trees in the central and western parts of the State, with those in the northern and eastern, to see that the former localities are quite preferable. I recently measured two apple trees in Kittery, one of which gave eleven feet nine inches in circumference, three feet from the ground; the other twelve feet nine inches, five feet from the ground. These trees are estimated to be two hundred years old. The oldest inhabitant can remember them fifty years ago, when they were in full vigor. They are still bearing fruit, although their hollow trunks and decaying tops show that they will soon pass away. They evidently belong to a hardy race, and have been favored with a good soil and location. We need not expect the puny trees of the present day to attain to the size and age of these, but if we desire the best trees that can be grown, we should be more careful to select the hardy ones.

Starting an Orchard.—How shall I start an orchard? Shall I set seedlings or buy Western trees? These are questions often asked by young orchardists. My advice to every farmer is to raise his own trees as far as practicable. and set only the best. If he wants to propagate Baldwins or other tender varieties, he should not graft until the trees are well started in the orchard. Duchess of Oldenburg, Talman's Sweet, and other perfectly hardy varieties, may be safely worked in the nursery. I should judge three-fourths of the trees that have been set during the past twenty years, were raised out of the State, mostly in New York. Some are well grown, many are rather refuse, with small roots, cramped and ill-shaped tops, and they are often bruised in transporting. When two thousand dollars are paid out in one year for Western nursery stock by *one town* in Maine alone, we can but see the need of doing something to check this drain.

More Questions—Can we not raise trees here quite as well suited to our wants as to send so much money abroad for them? Is it not better for us to propagate more largely from some choice sorts, which have their origin in Maine, and are of known repute for hardiness and market value? Some of the most vigorous trees I have seen growing in the State were from seed dropped by the wayside and in pastures. The feeble condition and early decay of some orchards is doubtless owing to the weak or diseased stock from which the seed or graft is taken. * * * * *

Pears—Chickens and Insects—Increasing attention is being paid to the cultivation of Pears, and in some places with good results. From some observations at home and in the western parts of the State, I find a larger per centage of pear trees are saved, and the entire failure of fruit is not so frequent as with apples. While visiting C. C. Barrett, of York, one of the most enterprising farmers in that section of the State, I was shown a lot of one hundred strong pear trees just set on soil well adapted to their needs—a strong, deep soil, inclining to clay loam. His eight to ten hundred young fowls among them were protecting them from the insect tribe. I will here ask if the borer has ever been known to damage apple trees where plenty of chickens have had access to them during the entire summer? I. Wells, of Kennebunkport, recently showed me a small orchard of smooth trees, where the soil had been effectually scratched over by his fowls being yarded under them. They had been set twenty-two years. He had gathered 10 1-2 bushels in one season from a single tree. Next to fowl, sheep are the best stock for pusturing in the orchard.

Seasonable Suggestions.—After exterminating the caterpillars, we anticipated about one-half a crop of apples this season, but must submit to almost an entire failure, many trees not having apples enough to pay for looking after; and the few which the swarms of insects have spared are often badly bitten. Early apples generally are doing better than late ones. Trees are making but a moderate growth, and are not looking vigorous generally. Care should be exercised in pruning trees now while in a feeble state; better wait until the tree recuperates and shows a healthier look, before amputating large limbs. With a sharp pruning knife in my pocket, while looking after or working alongside of my trees (most of which are in single rows by the fences), I can easily keep my trees clear of sprouts and useless wood, only using the saw occasionally. When I discover a vigorous sprout coming out below a diseased branch, I am careful to retain it, so as to make a healthy substitute for the old one. Again, a branch which shows symptoms of decay, may sometimes be saved by allowing just suckers enough to grow to keep up the circulation. With judicious pruning, I find the stump less inclined to "bleed" or turn dark and decay early than when pruned in the spring.—*S. N. T., Vassalboro', in the Maine Farmer.*

MISCELLANEOUS PAPERS.

On Preserving the Fertility of Orchards by Sheep-Grazing.

By A. W. Tinkham, North Monmouth.

The fact that many have failed in trying to dress an orchard by pasturing it with sheep, is, I think, owing to an error in the start. They have fenced in their orchards and put in sheep enough to graze them close, and the orchards have gradually failed. Now it is evident that the trees should have all the nutritive properties of the soil on which they grow. The sheep rob the trees of just so much as it takes to supply them with all the elements of life, together with their fleeces and the growth of lambs. My mode of proceedure is simply to have a large tract of pasture land connected with each orchard, in which I built a shed. The sheep will leave the most shady lawn and repair to the sheds for protection against winged insects, which are very obnoxious to them during the summer and part of the autumn. I can, therefore, tax as large an area for the benefit of the orchard as I please to enclose; and by using absorbents, such as dry muck, leaves from the forests, spent tan, or almost any fine vegetable substance, make a large amount of the very best of dressing for the orchard, which can be applied to such trees as the sheep desert, or to any favorite trees which it is desirable to dress highly. Spread about two bushels of this mixture around each tree, and from four quarts to half a bushel of wood ashes, according to the size of the tree. Mulch well with brakes, straw, leaves, hay, or best of all, potato tops. Kill borers and other insects, prune the trees carefully, and a good crop of apples will be as sure as a good yield of any other crop with high culture and good care.

RENOVATING AN ORCHARD.

BY "M," BRUNSWICK, (in Maine Farmer.)

In the discussions before the Maine Pomological Society, at their late meeting held at Winthrop, on the renovation of old orchards, I notice that no allusion is made to a method which has been adopted in this vicinity with good success; and I take the liberty by the permission of the editor of the *Farmer* (whose columns I sometimes fear I am taxing more than is beneficial to its readers), to give them the process which has renovated some of our old orchards.

In my neighborhood was an orchard which had been set for nearly one hundred years. The old farm on which it was located had not been cultivated for many years, and the only use made of it was for pasturage, and cutting hay on the low land. The old orchard on the place, yielded but very little of the poorest kind of native fruit, and the trees were full of dead limbs and moss. The land was purchased by a working farmer, who built him a house and commenced renovating the nearly exhausted land, most of which was a clay soil. The farm lying near the sea shore, he had facilities for obtaining sea dressing in abundance at small expense in labor, and that at a leisure season of the year. Around his old apple trees he spread a liberal coat of rock-weed, in the fall, and in the winter applied another coat of muscle mud, at the same season pruning off all the dead limbs, and also a large part of those still possessing a small share of vitality. In the spring the dressing was turned under by shallow plowing. During the following two years, these old trees threw out new and thrifty branches, a few of which were permitted to mature, and after growing two seasons they were of sufficient size to be grafted into, which was done with scions of choice varieties of fruit adapted to the locality. The old trees have formed new tops; the native bearing limbs were cut off the winter following the insertion of the scions, and for the last few years these trees have yielded a liberal supply of excellent fruit, and besides, the land yields a heavy crop of hay annually.

A CONTRIBUTION TO THE HISTORY OF ORCHARDING IN MAINE.

BY ALFRED SMITH, MONMOUTH.

A large portion of the pioneer settlers in Kennebec county were energetic, enterprising farmers, well skilled in agriculture, and were from Middleborough, Bridgewater and other towns in eastern and southern Massachusetts. They brought with them apple seeds selected from the hardiest and best fruit, and planted them in nurseries on moist, mellow shoal soil, at the foot of hills, a situation in which all trees grow with spreading roots, tap roots being unnecessary to draw a supply of water. Thus they were easily removed with all their long fibrous roots to higher land, suitable for orcharding.

I have the history, from tradition, of a small nursery, planted on a farm by the first settlers of Winthrop, nearly a century ago. About twenty years after (80 years ago) my father, Isaac Smith from Middleborough, Mass., bought the farm. All the seedling trees of this nursery had been carefully removed ten years before, a part of which had been planted on an acre and a half of good orchard land, near the house and barn, having an eastern cant. The balance of the trees were sold to various parties in town and planted on the beautiful hill-sides of Winthrop. The seed of those old orchards was selected from the very best eating and cooking apples, both sweet and sour or sub-acid—consequently the fruit was all very choice.

As like begets like, the orchards of Winthrop have originated and brought to the notice of the public, four as good, hardy autumn seedlings as can be found in the State, viz.: Winthrop Greening, Moses Wood, Smith's Favorite and Fairbanks apple; all of these should be more widely disseminated, especially the latter, and are far superior to any of the "Russian varieties grafted on crab stocks," which in my opinion is another humbug being practiced on the farmers of Maine. The Russian apples are handsome, which is their only good quality. They are coarse, and are in eating only about a week, save the Alexander, and are ripe at a time in the fall when the markets are glutted with fruit of a far superior quality, like the Porter and Winthrop Greening, and the others above mentioned, and others to numerous to mention, that are as hardy and are in eating from six to eight weeks, thus rendering them profitable to the grower, marketman and consumer; while the limited demand for the Russians will render them unprofitable like the crab apple, other than for making into cider. Nurserymen of Maine should select their seed for growing seedlings from the hardiest varieties, like the Northern Spy, Talman's Sweet, Yellow Bellflower, and the Winthrop seedlings. All the above sorts are as hardy as the Russians or the crab apple.

The pioneer farmers of Winthrop and the State as well, were very little versed in the art of grafting or budding trees, and it was thought to require as much skill to set a scion and have it grow, as to amputate an arm or leg. Seventy or seventy-five years ago the fall fruit of those old orchards was made into cider, and the winter fruit carefully stored in the cellars till winter. Then these energetic farmers would load up their pungs in the winter, the day before, with a barrel of cider and the balance in apples, and start a little past midnight for Farmington and Wilton, facing the cold northwest, and arrive there about sunrise. The cider would sell at from $6 to $8 per barrel, and apples at one dollar per bushel in exchange for wheat at a dollar per bushel. They would get the wheat ground at the mill and return home the same day, and the next day deliver and sell it in Augusta and Hallowell for cash, or in exchange for goods.

About this time the brothers Charles and Benjamin Vaughan came from England and settled on a farm in the Kennebec valley, near the town of Hallowell, and being gentlemen of intelligence and much interested in orcharding and general agriculture, they brought apple seeds, as well as the pear, plum and the English cherry seeds, selected from the best fruit of England, and planted a large nursery on their farm, and budded and grafted many of the trees and taught others to graft and bud. Many of these trees were planted in orchards in Winthrop and in the towns in the Kennebec valley. Undoubtedly the King Sweeting and many other good varieties had their origin from this source.

Now, then, we may all learn some lessons from the above facts and history, that may serve to teach us not to plant our nurseries with seeds from the pomace of refuse Baldwins and like tender sorts, but from the hardiest, best winter varieties, like the Northern Spy, Talman's Sweet, Yellow Bellflower, &c., and then, if properly grown and suitably planted in orchards, kept in garden culture and when large enough grafted or budded in the branches with hardy, annual, winter sorts, suitable for our markets and exportation, and annually fed with elements suitable for growth and fruit, we shall have success, and I think in no other way.

I will only add, that we might experiment with scions (taken from such nurseries as the above, grown from the best hardy winter sorts) and graft with the scions a few stocks in the tops of bearing trees whose fruit is not valuable, and thus perhaps obtain valuable winter seedlings adapted to this State and climate. The scions would dwarf and bear the second year after grafting.— *Originally published in the Maine Farmer.*

ESSAY ON FOREST CULTURE.

BY A. W. TINKHAM, NORTH MONMOUTH.

That the forests of the civilized world exert a powerful influence on the climate, the fertility of the soil, the wealth of the nations, the rain fall, and consequently on the health of the inhabitants, is not a controverted point; and that but little effort is made to restore them when destroyed, or protect those now remaining, is equally true.

We have but to refer to the history of ancient nations, to realize the direful effects attending the destruction of their forests. Liebig, the celebrated German chemist, is of the opinion that the decline of many of those nations is to be attributed to their neglect of agriculture, and their wholesale destruction of the native forests.

The Barbary States, once a wooded country, and densely populated, are now almost treeless, with a sparse population. Tripoli once claimed over 500,000 inhabitants, but is now reduced to less than 50,000, while the climate, which was once like that of Tennessee, is now so hot that steamships passing near the coast are obliged to keep their decks constantly wet, to preserve the lives of their passengers; and no out of door labor can be performed between the hours of 9 A. M. and 5 P. M.

The Spanish Peninsula was also heavily wooded and densely populated, but since the destruction of its forests has been reduced to the condition of a fourth rate power.

Granada, once noted for the fertility of its soil, its gentle rains and perennial springs, with its noble forests of oak, and other valuable timber, has now become an arid desert from the same cause. This was the last place surrendered by the Moors, and when forced to leave their loved country for the sickly shores of Africa, they turned their faces in their evening prayers toward Granada, imploring heaven to restore to them their lovely land.

Persia, once the proud mistress of Western Asia, since the destruction of its heavy forests has been reduced to the verge of starvation.

The terrible famine now raging in China, is attributed to the destruction of her forests.

When Napoleon landed his 40,000 veterans on the Delta of Egypt, in 1799, he found scarcely a tree from Rosetta to the first cataract of the Nile. They planted trees around their camps, and when compelled by fate to leave the land of the Pharaohs, the trees still remained as monuments to their industry and taste. The rulers of the land profited by their example, and set out millions of trees, which have worked wonders in the climate; for, while seventy-five years ago it seldom rained in Egypt, the forests now condense the vapors of the atmosphere, and refreshing showers are not unfrequent, gladdening the inhabitants and causing the waste places to "blossom as the rose."

But, while referring to other lands, let us not shut our eyes to the lamentable fact that our own country is beginning to suffer from the wholesale destruction of its forests.

The Ohio valley, once noted for its magnificent growth of deciduous trees, is now nearly denuded; its perennial springs have disappeared, and droughts are frequent and protracted. In some parts of Ohio, water has been carried three miles for culinary purposes; and the famous blue-grass region in Kentucky is not unfrequently deserted by cattle for want of water.

There are those who dispute the theory of analogy between the forests of a country and its rain-fall, and cite us to Ireland as a proof to the contrary, that being nearly a treeless country, and yet its rain-fall is immense; but this is no convincing proof; it is only an exception to the general law, and this is probably due to the fact that it lies in the track of the Gulf stream, which washes its shores with its tepid waves, and whose bosom is fanned by the prevailing southwest winds, highly charged with vapor, which condenses in passing over, thereby rendering it ever worthy of its appropriate name, "Emerald Isle of the Ocean."

But there are other reasons why we should care for our forests and plant new ones in waste places. It is a fact that the drain upon the forests of our country, is vastly in excess of their natural growth; the railroads alone require one million acres of wood and timber per year to keep them in running order; the ship builders, carriage makers, house carpenters and manufacturers of agricultural tools, consume a vast quantity, to say nothing of that used for fence building, and with the large amount used for fuel and wasted in clearing land, is enough to claim the attention of the most careless mind.

It is said that little, if any timber suitable for tools and carriage work, can be found west of the Missouri river.

The deciduous trees of California are not much better than the coniferous trees of New England. This should encourage us to plant nut-bearing trees, and those of the ash family, suitable for the western market.

One cause of the decline in our ship building interests, is due to the destruction of our once noble forests of oak, pine, and hackmatack. Most of the timber now has to be procured from the Chesapeake, thereby greatly increasing the cost, and rendering it impossible to contend with the cheap iron tonnage of foreign powers.

In view of the above facts, I commenced planting a forest in 1871, taking ten acres of worn out land that had been cropped till it would not grass over. I ran a fence around it as a protection against cattle and sheep; I plowed about three acres in furrows, two abreast, and about six feet apart—planted with red oak acorns at the rate of about one bushel per acre. They sprouted and were coming up finely, when the crows discovered them and made a thorough sweep, taking every one. I then sowed it with the seeds of the common white cedar (arbor-vitæ). Being entirely ignorant of the mode of cultivating the tree, it was with me simply an experiment, as I did not know that any one had ever planted any of the seeds before. The next spring they came up finely, but being exposed to the scorching rays of the sun, seven-eighths of them perished; but there are enough left to grow, as I planted them very thickly. They should be sowed in the shade of grass or small bushes, to protect them from the scorching heat of the midsummer sun. The seeds are easily gathered, by holding an inverted umbrella under the tree and whipping the boughs with a rod.

I next planted two acres with the seeds of the white pine, in the same manner that I did the acorns, and they are doing well. The cones should be gathered about the 20th of September, and spread on hay-caps in an open loft; when dry they can be shaken out easily. If the gathering is delayed till the 10th of October, the seeds will have nearly all dropped out.

I did not feel like giving up to the crows, so I planted two acres more with acorns, in the following manner: I took a bricklayer's trowel, made a perpendicular incision in the turf, dropped in the acorn and closed the aperture. They came up nicely, the crows were outwitted, and they now are doing well. In the centre was a worthless marsh. This I drained with considerable expense, and set out a row of trees on its western verge—cedar and hackmatack—so that the prevailing westerly winds will waft the seeds over its surface.

I would recommend the planting of hackmatack seeds on moist ground, as they are very hardy and of rapid growth, and are quite valuable for ship timber. They also bear transplanting well.

Nut-bearing trees, such as walnut, white oak, and many other kinds might be raised with profit. About thirty years ago, the venerable Rev. William A. Drew planted some nuts which he procured at a store in Augusta. They came up and are now comely trees, the observed of all observers, and stand as monuments to his skill and taste.

There is in the western part of the pleasant town of Wayne, a range of sand hills, as bare and desolate as the desert of Sahara, yet the old settlers say that less than a century ago they were covered with a beautiful growth of deciduous trees, (mostly beech) and when cleared they produced bountiful crops of the cereals, but as soon as the potash in the soil was exhausted, the winds commenced blowing it from the tops of the hills, covering the rich valleys below, and rendering them as sterile as the hill-tops. But it is believed that this wholesale destruction might be averted, and the barren district re-forested, by planting with the Carolina tar-pine, (common pitch pine) the seeds of which can be obtained in large quantities from Plymouth County, Mass., where they flourish well on land quite as barren as the sand hills above referred to.

MAINE DAIRYMEN'S ASSOCIATION.

TRANSACTIONS FOR 1876–7.

The Annual Meeting of the Maine Dairymen's Association for 1876, was held at Dover, Piscataquis County, February 13th, 14th, 15th, in Brockway's Hall. As the first day was quite unpropitious the meeting was thin, and but little was accomplished. Wednesday, the second day, opened finely. The third day was pleasant and there was a large attendance.

In the absence of the President and Vice President, the meeting was called to order by the Secretary, who called the Hon. A. M. Robinson to the chair. Permanent organization was effected at a later hour, by choice of Rev. E. B. Averill as president *pro tempore.*

The first day was spent in comparing notes, collecting statistics, and general discussion. The reports were generally favorable.

The East Sangerville cheese factory was reported by H. L. Leland, Secretary. Total amount of milk received, 372,605 pounds; amount of cheese manufactured, 41,063 pounds; number of pounds of milk to one of cured cheese, 9.2; received for manufacturing cheese, $821.26; cost of manufacture, not including interest on stock, taxes and insurance, $578.16; income above cost of manufacture, $243.10; commenced making cheese June 1st, closed factory Sept. 21st; in operation 113 days; whole number of patrons furnishing milk, 75. Those making the largest quantity of cheese are Enos G. Flanders, 3,096 lbs., F. D. Dearth, 2,063 lbs., Daniel Page, 1,958 lbs., L. L. Dearth, 1,553 lbs., H. L. Dearth, 1,517 lbs., Geo. Pond, 1,460 lbs., J. P. Leland, 1,280 lbs., Benj.

Lane, 1,243 lbs.—several others also average above one thousand pounds.

The report for the year 1876 is as follows: Total amount of milk received, 190,310 lbs.; cheese made, 20,580 lbs.; number of pounds of milk required to make one of cheese, 9.23; received for making cheese, $412.38; cost of making, $386.23; income, $27,15; patrons furnishing milk 47; period in operation 87 days. The superintendent each year was C. F. Moore of North Anson.

In the brief report of two years' manufacturing here presented, it will be noticed that there is a falling off in the number of patrons furnishing milk, from 75 to 47; also an equally large falling off of milk furnished and cheese made. This decrease is not to be attributed to any fault in the management of the factory, or to any lack of confidence in the advantages of the association system of cheese making; but rather to the low price received for cheese, and the want of a ready sale for cash. Many farmers thought that better results might be had in making butter. I believe, however, the higher price now received, and readier sale now being had for cheese will convince them that the factory offers the surest way to success. The company anticipate, and not without reason, a largely increased amount of milk the coming season.

Wednesday afternoon, Daniel Spooner presented the following paper upon

SOME REASONS WHY DAIRYING DOES NOT PAY WHAT IT MIGHT.

I propose to state a few of the many reasons why we so often hear one class of farmers saying that Dairying does not pay, and that Associated Dairying is a failure in this State.

In the first place, many of the cows kept by this class of farmers are of an inferior quality; they do not produce milk enough to pay for the fodder they devour. The cow that does not pay more than thirty or thirty-five dollars a year, does not any more than pay the keeping. Too many cows that are poor milkers are kept by our farmers and dairymen. More pains should be taken in raising calves for cows; raise only such as come from cows that are good milkers. Too many calves that come from our best cows are sold to the butchers; they are usually large and in good order, and command a high price. The cost of feeding a cow that pays sixty or seventy dollars is not much more than the cost of keeping one that will not pay more than thirty dollars a year. The owner of these inferior cows is disappointed in the amount of butter and cheese that he receives, and says that dairying does not pay! If he sends his milk to the cheese factory he gets but small returns, and then he will say that Associated Dairying is a failure! The fault is not always with the cow; a good cow may be made a poor milker by the care and usage that she receives—poor pasturing, late-cut hay and harsh treatment, will make a poor cow of one that with good feed, and good usage, would be a very good cow.

I am happy to state here that there are many good cows in this county that pay largely for their keeping. You don't hear the owners of these cows say that dairying does not pay. Mr. Simon Crockett of this town, gave me some figures two years ago this winter, showing the amount that his herd of cows paid the previous year. I think it was ninety dollars, or nearly that, to each cow. In answer to my inquiry how much provender he fed, he told me that he gave them but little. They had good pasturing through the summer, and early cut hay, with some provender, through the winter. Mr. Crockett will not say that dairying does not pay. There are many other herds of cows in Piscataquis county that pay as well as Mr. Crockett's. Owing to the decline in the price of dairy products, these cows that I speak of do not, probably, pay as much at this time as they did two years since. The decline in the market price of dairy products has, no doubt, had a tendency to discourage many of our farmers in regard to the dairying business. Let us see about this. Has the price of dairy products declined any more than other products of our farms? We will except, if you please, potatoes, at the present time. Supply and demand governs the price of all the products of our farms. The potatoe crop in the western States was unusally light last year, and also in some of the middle States; consequently the supply is not equal to the demand. This may not happen again for five or ten years. The price of wool and lambs has gone down, yet good sheep, well cared for, are paying property. Those who are engaged in manufacturing different kinds of cloths might as well say that their business is a failure because the price of their cloths have gone down, and with the same propriety that the farmer says that dairying is a failure. The general depressed condition in the business of our country is the probable cause of the decline in the price of farm products. Labor does not find sufficient employment to create a demand equal to the supply. We must not be discouraged, brother farmers. This stagnation in the business of our country will not, I think, continue much longer. Our capitalists will not let their money remain in the banks at two per cent. interest; they will invest it where it will give labor employment, and a fair compensation for its services. Then all the produce of our farms and factories will be in demand.

Dairying in Maine is now in its infancy. It has been only about five years since the farmers in this State began to think earnestly about this branch of farming. They saw what other States were doing in this business. Had the farmers in Maine commenced building cheese factories as early as they did in other States, I think it would have been better for that class at this time. We should have more experience in the business; and consequently more perfection in the quality of our cheese, and better system in the management of our factories.

Maine must, inevitably, become a dairying State. Her climate and her soil, and its adaptedness to growing all kinds of grasses, point to that result. Very much remains to be done by improvement, not only in our cows, their feed and general management, but also in manufacturing a more uniform and better quality of cheese.

This elicited some discussion, after which H. L. Leland presented a paper upon

"THE ADAPTABILITY OF MAINE TO DAIRYING."

He commenced by saying that Maine has been equally successful with other States so far, in dairying, in proportion to the care, time and attention bestowed upon it. Dairying has been successful equally with other branches of farm industry. In Vermont, New York, Massachusetts, and other States, they have been eminently successful in this business. We possess the same favored conditions as they, and our climate, soil and surroundings are similar. If we observe the same particulars, and conduct the business with the same care, we shall obtain the same returns. In those places stock is kept in the pasture at night, and only yarded or stabled at milking time; this keeps the pastures from running out. Their pastures are seldom or never plowed, as they consider plowing grass land injurious to its productiveness. They top dress and night pasture, and we must do the same. We must renovate our pastures, as they are too often moss patched and bush overgrown. From pasture feed we make nearly all our profit. He recommended to plow as little as possible, and believes in permanent pasture, and that they should be helped out by soiling, western corn being planted for this purpose. No dairyman should expect cows to get their living wholly at pasture. Plow and cultivate less, plant less potatoes and hoed crops, and give more attention to fields and pastures—to the grass crop.

An interesting discussion followed upon the points brought out in the paper, participated in by Daniel Spooner, H. M. Smith, E. B. Averill, Leonard Robinson, Rev. J. H. Gurney, and others. The question of how to renovate our depleted pastures, excited considerable attention. There was a division of opinion, some taking sides with the paper, others that many pastures can best be renovated, where arable, by plowing and seeding, applying at the same time some good fertilizer.

H. M. Smith of Orrington, who sells his milk in Bangor, gave an account of his operations. He keeps from twelve to fifteen cows, and feeds four quarts of shorts and two quarts of cotton seed meal per cow, daily, in two feeds—morning and evening, with extra, early cut hay. He uses green feed all summer, planting fodder corn in large quantities, which he never wants to become over six feet high. His cows produce 3½ gallons of milk per day. His dry cows he feeds but one-half the above quantity of meal. Early in the spring he burns off the dead grass in his pastures, as the grass starts quicker, and on such spots the cows obtain their first feed—the ashes stimulating the growth of the grass. His choice for cows is a cross of the Shorthorn and Jersey. His cows go dry two months, upon an average, in the year. It costs $60 per year to keep a cow, and her income will average $110. His milk sells for 6 to 7 cents per quart. His provender is fed dry.

Mr. Flanders said his cows, fed on good hay, would give 20 to 22 pounds of milk per day. He feeds provender in the spring only, and feeds bean meal once a month, as he thinks it a preventive of the garget. He keeps salt three parts, and sulphur one part, in a trough where the cows can obtain it as they want.

Leonard Robinson gave his experience in dairying, which during the past thirty-five years had been the most profitable business with him. He top-dresses his grass lands, using five cords per acre once in three years. He thinks highly of oat and pea meal as a feed.

The *food* of cows secured a large share of attention, and statements were made of general interest. The pasture was treated as essential to profitable dairying. Why may we not keep pastures in as good condition as farmers do in Massachusetts and Vermont? While our pastures bear the same general features, and can boast of as good soil, and less years of wear and waste, still they are far behind in good appearance and productiveness. This may be traced to several reasons. They keep their stock in the pasture by night, do not yard it, as we do, gathering dressing for the field which belongs to the pasture.

We do not top-dress with plaster, lime, bone-dust and other manures, as they do. We do not by mowing, kill out bushes and hurtful weeds, as should be done. We labor more to improve our fields, to the neglect and injury of the pasture. Still the growth of our stock and the profits of our dairies depend largely upon the state of the pasture.

A spirited discussion arose upon the comparative profits of top-dressing grass lands, and of plowing in manure and cultivating crops. Top-dressing was advocated with so much warmth by some, that a stranger might conclude that they had a serious grudge against the plow and hoe. Rev. Mr. Gurney reflected much light upon the subject, from his observations in Massachusetts. There the farmers top-dress extensively; but they mix their manure with compost—soil of any kind—and when this is spread upon the surface, as it has volatile matter, it will not waste so much by evaporation, and will protect the grass roots from the killing cold of winter. It may be insisted that wherever manure can be smelled in the surrounding atmosphere, be it spread upon the surface, or in the heap, or hog yard, or in any vault, then ammonia is escaping, and the farmer is losing the enriching portion of his dressing.

Mixed with earth, the ammonia is absorbed and promotes vegetable growth. It will always be safe to plow or harrow in manure as soon as possible after being taken from the shed or cellar.

It was conceded that certain moist soils, those unfit for the plow, had better be top-dressed; but dry, arable soils should be plowed and cultivated.

Provender was another engrossing item. No cow would yield a fair profit without something besides hay and grass. Fodder corn fed in August and September, has been found to pay well. The root crop should not be neglected. Ground oats and peas, and shorts mixed with Indian or cotton-seed meal, was regarded as the most profitable provender on the whole. Feeding well when the cows were shrinking in milk, was highly recommended.

J. W. Lang, Brooks, said he was on the farm of Hon. W. Percival of Vassalboro', last spring, and saw a method of top-dressing that was new to him. It might give others a useful hint. In the autumn Mr. Percival spreads on a liberal coat of long or unrotted stable manure, just before the snow comes. In the spring as soon as the snow is off, but before the frost is out enough to allow poaching the field, he puts on a heavy brush harrow and brushes and pulverizes the clods and lumps in and about the grass roots and into the stubble. The following rains complete the work, and this is found to be not only an economical, easy and safe method, but also a very remunerative one. Others may profit by the example.

After some further discussion the meeting adjourned to evening.

At the evening meeting J. W. Lang presented a paper upon

SETTING MILK AND BUTTER MAKING.

Anything that can be introduced at reasonable cost that will facilitate or aid in improving the work or product of our dairies, we ought as a blessing, and for our interest, to make use of as much as possible. A cold spring over which a house may be erected, and waters of which may be utilized by conducting through a tank in which the milk is set, would be a great improvement over the method we have been obliged to use in setting our cans.

The deep can system is somewhat new in this State, though some of our leading dairymen have used them for several years; but in New York, Vermont and Ohio, the system is well known and largely practised, and is in use in nearly all the dairies where first-class "gilt-edged" butter is produced. Our experience with it the past season has led to the following facts, viz: that it is less costly in outfit; that it enables the making of superior butter during the hottest weather; that it is less work than by setting in shallow pans, and that by it butter can be produced of uniform quality.

Our cans are made to order by a tin-smith at Belfast, our market town. They are a trifle larger around than a six quart pail, and about twenty inches high. They are as large as can be made from two sheets of tin; the bottom is put on as on any pail. Imagine a hollow tin cylinder some twenty inches high, nine inches in diameter, with bottom and cover, ears and bail, and you have the deep can exactly. Now how is it used?

Strain the milk into it fresh from the cow, let it be filled to any point to within three inches of the top, put on the cover and set it in any cool place—the cooler the better, if not below forty degrees—a tank, spring, or well, a refrigerator, or room adjoining an ice-house. We used a convenient well near the house, hoisting the cans in and out by a windlass, and suspending them in the water by a small cord. This worked well and proved satisfactory.

The skimming is done with a conical shaped dipper, which is sunk in the deep cream till filled, then emptied into the cream can, and the operation repeated until there is nothing left but the blue milk.

Cream rises several inches deep, and as the milk is kept sweet the cream is sweet and light. Our average time for setting was forty-eight hours, and the milk always came out sweet. One can was left several times sixty hours, and it came out sweet two or three times, and this during July and August. The cream can was put back into the well and left there until the day before churning, when it was taken out over night and the temperature allowed to rise to sixty-two degrees—the temperature for churning. The butter always came hard, sweet, and nice, which is a highly desirable object, and imperatively necessary in the making of superior butter.

If we were going into ever so extensive dairying, we should prefer the deep cans, for summer use especially. They can be used the year round, but water and ice in the fall, winter and spring not being needed when the temperature is below forty-seven degrees, some suitable place where the temperature can be kept near the required forty-seven degrees should be used.

Rev. J. H. Gurney then gave some extended and interesting remarks in relation to

REQUISITES OF SUCCESS IN ASSOCIATED DAIRYING;

The principal points of which were: Cleanliness in handling milk and in manufacture; good feed and water, and kindly treatment of cows; the keeping of good cows; the constant aim and effort to make an increasingly good product, which shall create a demand and make a good market for itself. He had travelled extensively in dairy regions of other States. We must feed better, and provide better pastures and forage crops. We should pay more attention to soiling crops. Mr. Gurney is a thorough believer in associated dairying and its possibilities in Maine.

THURSDAY FORENOON.

Mr. Luther Chamberlain opened the discussion on

RAISING HEIFER CALVES FOR THE PURPOSE OF MAKING DAIRY COWS.

He thought one wanted to keep down the inclination to fatten, in cows, and stimulate the milking qualities. He could raise a better cow from a fall, than from a spring calf. Heifers should come in at two years of age, and the calf be raised on skimmed milk, using some shorts in the milk. The feed of his cows is one quart of cotton seed meal per day, and one bushel of turnips raw, which he prefers to potatoes. Roots do not take the place of grain in feeding. The meal is fed raw, and he esteems shorts next to cotton seed meal in value.

D. Spooner raised two calves two years ago, which were taken from the cow at four days old. They were given one pint of sweet milk each, for two weeks, then given skimmed milk in which a few shorts were stirred. In two weeks more this was changed to sweet whey and shorts, in two weeks to sour whey and shorts; and they are now two good heifers, coming in this spring.

Mr. Smith of Orrington, gave in detail his method of raising calves. He seeks to obtain a good calf from a good cow, which he weans from its dam at three days old. He then feeds two quarts of new milk at each feed, twice per day, gradually decreasing the milk for twelve weeks, and then gives shorts and oats, and omits the milk entirely. The calves readily learn to eat hay at a few weeks old. He feeds his cows three times a day, feeding hay and meal together, the latter dry; and he believes the meal fed to animals should be fed raw, as a general thing. In purchasing a cow, he relies largely upon the milk mirror, and a large, crooked milk vein, with a large orifice where it enters the body. He prefers a short, crumpled horn, with room between the eyes, a clean, neat muzzle, and wide between the hind legs; the color of the skin should be yellow, with a waxy, soft, unctious touch. The cow should have a small, thin neck, be heavy behind and light forward. The discussion was further continued by Mr. Chamberlain, Mr. L. Robinson, and others.

Thursday afternoon was taken up by a general discussion, reports from cheese factories, &c. Mr. Spooner gave an account of the Dairyman's Board of Trade, organized at Bangor last June, which has done nothing since its organization. Mr. Frank Buck occupied considerable time in an address upon our dairy interests, particularly in reference to cheese making. Mr. Buck also stated that from experiment he is satisfied that milk will throw up its cream better when set in a light, than when set in a dark place.

At the annual meeting the following officers were elected for the ensuing year; President, L. L. Lucas, St. Albans;

Vice Presidents, J. R. Nelson, Winthrop; J. W. North, Jr. M. D., Augusta; Frank Buck, Orland; Secretary, J. W. Lang, Brooks; Treasurer, Daniel Spooner, East Sangerville; Trustees, Z. A. Gilbert, East Turner; E. S. F. Nickerson, Houlton; S. Dingley, Sebago Lake; S. Dill, Phillips; S. N. Kent, Bucksport; J. H. Moore, Winthrop; E. W. Anderson, Warren; L. M. Kennedy, East Jefferson; H. M. Smith, East Orrington; Obed Towne, East Dover; T. P. Whittemore, Bowdoinham; B. M. Hight, Skowhegan; A. C. Currier, Morrill; M. L. Wilder, Pembroke; J. McIntyre, Biddeford.

It was voted to hold a Fair next fall in connection with the State or some county society. The committee to make arrangements for the same, were L. L. Lucas, Obed Towne, H. M. Smith. Committee to memorialize the Legislature for annuity and aid, A. M. Robinson, F. Buck, J. W. Lang.

The committee appointed to examine and report upon the dairy products present on exhibition, consisting of Dr. E. A. Thompson, W. F. Washburn, Mrs. Jason Hassell, Mrs. Lucy Dinsmore and Mrs. A. Jackson, after attending to the duty assigned them, reported as follows:

To the President of the Maine Dairymen's Association:

BUTTER. Number of samples exhibited, six. First sample examined was presented by H. L. Leland; winter butter; cows, grade Jerseys; feed, hay and roots; milk set thirty-six hours before churning; uses judgment in regard to temperature of cream, stirs often, warms the milk in about twelve hours after milking, removes the buttermilk with paddles, and salts by judgment. Good flavor, good color.

Two samples by Mrs. A. Jackson. June and September butter; cows natives. June butter, cows fed on grass only; fall, corn fodder in addition to grazing. Milk sets thirty-six hours; cream removed before milk sours; milk kept in a cellar used entirely for milk; uses dash churn, uses her judgment in regard to temperature; adds salt and stirs frequently before churning. Both samples sweet, good color, and finely preserved; buttermilk removed by working with hands.

One sample by Mrs. Lucy Dinsmore. Winter butter; cows grade Jerseys; feed, hay; milk set thirty-six hours; uses her judgment in regard to temperature, adds salt to cream, stirs often; works butter by hand to remove buttermilk; always adds carrot juice to winter butter to flavor and color. Sample sweet and finely flavored.

One sample presented by Daniel Spooner. Winter butter; cows grade Durhams; feed, hay and roots; removes cream before milk sours; temperature 62°; works out buttermilk with paddles. Sample sweet and good flavor.

One sample of winter butter presented by Dr. S. W. Elliott. Cow, grade Jersey; feed. hay, one quart of Indian meal and two quarts shorts once a day. Removes cream in twenty-four hours; uses judgment in temperature, works buttermilk out with hands and paddles. Cow has given 130 quarts milk the last ten days; made 13¼ lbs. butter in same time. This sample had a very fine, sweet flavor, and the color was yellow.

Specimens of cheese from the East Sangerville Factory were examined and pronounced prime.

The season of 1876 was one of average returns to the dairymen of Maine, both in quantity and quality of product, but prices ruled low. There was continued reaction in Associated Dairying, and several factories did not operate. The cows released from cheese making, helped swell the volume of butter made, and depress somewhat the local butter markets. This reaction came principally from the low price of cheese. Many joined in the cheese factory mania with visions of sudden wealth, or greater returns than experience would give. They went in hastily, and out as quickly. They were not willing to learn the conditions, and patiently work upward in the scale of excellence and profit.

The first step toward improved dairying in Maine is better feed; the next is better cows; the third is better care and skill in making and handling, and fourth better sales, which will come and are wholly dependent upon the first three. We have a great many excellent dairy men and women in Maine, but there is a chance for improvement always. If, then, there is a chance for the best to improve, what a wide margin there must be for the classes ranging from the medium to the poorest!

We are happy to report that our observation and information leads us to believe that there is a gradual improvement, everywhere in the State, in dairy matters. Jersey and Ayrshire blood is being largely infused, and now scarcely an isolated hamlet that has not a sprinkling. The Shorthorn, Dutch, and other desirable dairy breeds, are no strangers. These animals are better cared for than their predecessors; their milk is handled more understandingly; there is more inquiry and criticism; new methods are being investigated, new apparatus tried; experiments are made; information is eagerly sought. As a consequence there is more demand for the better class of dairy products. Supply and demand are reciprocal, and when the latter leads the former will follow closely. The demand to-day for "gilt edged" butter is greater than the supply. It will necessarily lead for some time.

The returns from the various cheese factories are so meagre that we forbear tabulating them. Full returns would show considerable falling off. This is inevitable, but it will bring the business down to the hard pan of practical utility. Those factories that have been best sustained show the best returns, and give the most satisfaction. Nothing can succeed with half-hearted effort.

The dairy interest of Maine is second to no other. It is the leading farm industry. The cow with her offspring and products, represents plenty and profit. It is the highest praise that can be bestowed upon any land to say "It flows with milk and honey." Milk first, because it is the only perfect food. Maine flows with milk. Its producing capacity can be doubled every five years by judicious effort. The dairy, with its attendant piggery, the sheepcote and the hennery, are the three inexhaustible sources of our farm industry. We may not be able to compete with other sections in fruit, cereals, or manufactures, but in these three we have all the guaranteed elements of success.

TRANSACTIONS FOR 1877-8.

The fourth annual session of the Association was held with the South Paris Dairying Association, and Oxford County Agricultural Society, at South Paris, in Oxford County, February 12-14, 1878. The attendance was not as large as had been anticipated, and but few were present from a distance. The traveling was good and the weather fine, which contributed much towards making the meeting a success. Those who attended had an enjoyable time, and the meeting was productive of much good.

The meeting opened Tuesday forenoon at ten o'clock, with the

ANNUAL REPORT OF THE SECRETARY.

The season of 1877, throughout the length and breadth of the State, was a remarkable one in many particulars. An exceptionally early Spring, the snow disappearing in April, was followed by months of unusual dryness. Only slight rains fell, except in a few sections, till late in the Fall. The feed started early, but grew slowly. The hay crop was below an average, and though quantity was less, in most cases quality was superior when cut early.

The dairy product has been one of average return. In quantity, more butter, as usual, than cheese has been produced. In quality, both butter and cheese have gradually advanced. There is less poor butter put upon the market year by year, owing to better means for producing and taking care of it, and more knowledge and care in manipulating it. Though our approximation in the right direction is slow, it is none the less true or encouraging to the progress made. The interest in dairying, aroused somewhat a few years ago by a feverish desire to reap great advantages at once by associated efforts in the shape of cheese factories, has had its inevitable reaction, and many a factory, established with ill-judged haste or unwarranted expectations, has been closed or sold out, while others, and by far the greater number, going calmly on their way, studying their business as individuals and as a company, have survived the adverse fates and made a steady onward progress toward final and complete success. In this connection we would have a word to say to all associated dairies. Persevere! Cheese factories are a good thing and will pay. But you must conduct them upon thorough business principles and with as rigid economy as you conduct any business. The great difficulty has been that it has cost too much to run them. Help, supplies, management, &c., must be reduced to a minimum. Often there is too much capital invested in the building. It was thought that the factory must be finished up like other buildings, and much laid out for looks. It was a mistake which we all fell into. The factory is a warm weather building. It needs nothing for ornament. It need be only tight enough to exclude rain, dust, and sudden changes of weather. All it is required to do in Winter is to protect the apparatus within it. A building costing from $300 to $600 will be found of just as much utility as a cheese factory, as one costing $1,200 to $2,000. The less amount of capital will ease the burdens of the society in the matter of interest on stock. In many instances too high wages were paid. It was a new business, and the cheese makers had the advantage of us.

Another great obstacle to our success heretofore, and now, in associated dairying, is the small amount of milk furnished at each factory. Many factories have less than one hundred cows. We never had a three-hundred cow factory in the State. Kenduskeag reported, one year, two hundred and fifty cows, and that year it was the most successful factory in the State. We might as well attempt to run our cotton factories without adequate supply of cotton, or our shoe factories without sufficient amount of leather, as our cheese factories without milk to their full capacity. Stock up or sell out is the part of wisdom. The former is the part of wisdom, the latter the result of present management.

In order to aid sales of dairy products, more especially of our factory cheese, in large quantities, and at the request of some of the leading factories a Board of Trade was organized for the State, by-laws published and sent out, and cordial invitations given to cheese factories, private dairymen, and dealers to join the Board and carry forward to successful operation its designed benefits and conveniences. That has never been done, and feeling that the Maine Dairymen's Association has done its duty, after completing the organization of the Board and placing it before the dairymen, factories and public, it has rested it here. If anything more can be done by this association consistently, it is ready and willing to listen to suggestions and take such action as may be deemed best.

In this connection we quote from the observations of S. L. Boardman, Esq., Secretary of the Board of Agriculture:

"It is quite impossible to obtain accurate statistics of the business of associated dairying in our State. Cheese factories are, in the strictest sense, private corporations, and are obliged to make no returns whatever, to any person or department, of the amount of business done or the number of pounds of cheese made. The facts in which the public, and especially farmers, are interested, are readily obtained from some factories, and from others repeated requests for information receive no attention, and meet with no response whatever. In this condition of things, it will be at once seen that it is impossible to obtain accurate statistics of this industry in any year. In 1875, there were sixty cheese factories in operation in this State, and in 1876 returns were received from but thirty-five; yet it is believed that the business of associated dairying in Maine had not depreciated to the extent indicated by the less number of factories from which returns were received in the last named year. The fairer inference is that many factories, from having made a less amount of cheese in 1876 than in 1875, refused to make any report to any source from which a statement of their business would be likely to be made public. Taking these facts into consideration, it is fair to say that any statement of the amount of factory cheese made in this State in any one year is rather comparative than accurate, and is to be taken with some allowance.

So far as we are able to report this industry for 1877, reports have been obtained from twenty-seven factories, against thirty-five in 1876. In the returns for 1876 are reports from thirteen factories not heard from for 1877, and the returns for 1877 give reports from seven factories not reported as in operation in 1876. So that the business of associated dairying in Maine can but be regarded as somewhat variable, depending upon local conditions and circumstances as to whether they operate or not during any given year."

During the season of 1877, the Houlton factory operated the greatest number of days (a little over six months), and produced the greatest amount of cheese of any factory in Maine, viz: 42,187 lbs—against 30,986 lbs. made in 1876, in a little over five months. The shortest period any factory operated was nineteen days, the Andover factory, in the month of July, making 850 lbs. The least amount of cheese made was by the East Jefferson factory—one of the first organized in the State—which produced only 5,954 lbs. in a season of nearly two months, from 150 cows. The managers of the Houlton factory show wisdom in extending the making season over as long a period as possible, as by this course comes a largely increased profit over running the factory for a short season only. It is a plan other factories could follow to great advantage.

Secretaries of Cheese Factories in Maine.

NAME OF FACTORY.	SECRETARY.	P. O. ADDRESS.
Andover	W. H. Talbot	Andover.
Aroostook	G. A. Parsons	Presque Isle.
Carmel	John Harvey	Carmel.
East Jefferson	J. J. A. Hoffses	East Jefferson.
Exeter	L. D. Butters	East Exeter.
Etna	J. E. Friend	Etna.
East Rumford	J. R. Austin	Mexico.
East Sangerville	H. L. Leland	East Sangerville.
Freedom	D. B. Johnson	Freedom.
Fryeburg	A. B. Walker	Fryeburg.
Houlton	Francis Barnes	Houlton.
Kenduskeag	F. D. Jenkins	Kenduskeag.
Morrill	A. C. Currier	Morrill.
Milo	E. H. Gould	Milo.
Newport	Samuel F. Buswell	Newport.
North Turner	J. L. Quimby	North Turner.
North Jay	N. L. Phinney	North Jay.
North Pownal	C. E. Fogg	North Pownal.
Phillips	A. L. Bradbury	Phillips.
St. Albans	N. B. Turner	St. Albans.
Sandy River	T. B. Hunter	Strong.
Six Mile Falls	J. F. Jordan	Six Mile Falls.
Stetson	John Rogers	Stetson.
Union	F. A. Seiders	Union.
Wilton	Enoch Bridges	Wilton.
Winthrop	J. H. Moore	Winthrop.
West Minot	H. C. Howard	West Minot.
Winterport	Joseph H. Carlton	Winterport.

Names of factories from which returns have been received

NAME OF FACTORY.	Opened.	Closed.	Greatest number of Cows.	Average number.	Total pounds Milk received.
Andover	July 2	July 21	36	30	9,712
Aroostook	June 11	Sept. 15	-	-	178,694
Carmel	May 28	Aug. 26	176	150	221,512
East Jefferson	June 11	Aug. 21	-	-	62,129
Exeter	May 28	Sept. 29	150	100	225,502
Etna	May 28	Sept. 8	-	-	207,897
East Rumford and Mexico	June 11	Sept. 8	100	80	140,000
East Sangerville	May 28	Sept. 22	185	140	238,992
Freedom	June 18	Aug. 18	-	-	61,913
Fryeburg	June 4	Sept. 29	65	55	96,186
Houlton	May 1	Nov. 10	-	160	414,483
Kenduskeag	June 4	Sept. 30	-	-	281,064
Morrill	June 18	Aug. 24	90	70	92,000
Milo	June 4	Oct. 6	60	40	121,707
Newport	June 5	Sept. 1	75	-	128,431
North Turner	May 7	Sept. 28	200	140	338,773
North Jay	May 21	Sept. 30	218	140	263,171
Phillips	May 21	Aug. 22	-	-	151,985
St. Albans	May 28	Sept. 7	250	105	218,109
Sandy River	May 7	Sept. 1	-	-	193,015
Six Mile Falls	May 1	Aug. 4	-	-	87,139
Stetson	May 29	Sept. 30	200	-	427,097
Union	June 25	Sept. 1	177	125	155,629
Wilton	June 4	Sept. 9	100	75	126,700
Winthrop	May 21	Sept. 15	200	-	323,086
West Minot	June 6	Sept. 5	180	140	193,030
Winterport	May 28	Aug. 25	160	100	154,442

in 1877, and the number of pounds of cheese made by each.

Most for one day in pounds.	Pounds Cheese made.	Average weight of Cheese.	Pounds Milk to one of Cheese.	What part of Cheese is sold.	WHERE MARKETED.	Price obtained per pound.
580	850	25	10	Two-thirds.	At Home.	12 cts.
2,874	17,682	482	10,105	All.	At Home.	13 "
3,300	21,526	47	10.2	Five-sixths.	In this State.	11¾ "
2,500	5,954	33	10.50	All.	At Home.	12 "
3,028	26,915	32	8.75	All.	Portland and Bangor.	11 *a* 14 "
3,300	19,399	44	10.66	All.	Portland.	12 "
2,200	14,000	35	10.	All.	At Factory.	12 "
2,834	–	35	10.	Three-fourths.	Portland.	12 "
–	–	35	10.	–	– –	–
1,200	9,848	33	9.75	Three-fourths.	At Home.	14 "
4,326	42,187	55	9.8	All.	Boston.	12 "
3,691	26,931	39	10.44	One-third.	Portland and Bangor.	12 "
1,706	9,007	38	10.25	All.	Belfast.	12 "
40,000	13,500	45	10.25	All.	Portland.	12½ "
2,062	12,861	36	9.25	One-half.	At Home.	12½ "
3,150	35,500	37	9.80	All.	Lewiston and Auburn.	12½ *a* 13½ cts.
3,123	25,724	39	10.25	Three-fourths.	Bath and Portland.	12 cts.
2,123	15,200	43	–	One-third.	At Factory.	12½ "
2,885	23,847	42	9.	All.	Portland.	12½ "
–	18,861	38	10.25	All.	Portland and home.	12½ "
1,538	8,984	30	9.59	All.	Bangor.	10 *a* 15 "
4,722	–	48	9.50	One-half.	– –	12 "
3,000	15,237	42	10.20	All.	Rockland & Waldoboro'	13 "
1,696	12,675	30	10.	Five-sixths.	Portland.	12 "
3,768	35,006	48-19	9.28	All.	Local markets.	11 *a* 13 "
3,058	19,739	42	9.78	All.	– –	12 "
2,204	14,856	50	10.33	All.	Winterport.	12½ "

Among the interesting details which the returns from the above factories show, is that very nearly the entire amount of the cheese made has already been sold, mostly at local markets, and in no instance below 11 cents per pound, the price obtained ranging from 11 to 15 cents (for fancy make green cheese), the average price being 12½ cents per pound. In one instance only is a place out of the State reported as being the place of sale, that of the Houlton factory, whose market is Boston. It would be a good thing for the dairymen, at the approaching session of their Association, to devise some plan, if possible, whereby accurate and reliable returns from all factories in the State may be obtained and made public.

Considerable advance has been made in dairy science the past year. New methods in setting milk have been brought out or disseminated. The practical and successful application of the sub-earth duct, simplifying and cheapening its construction, promises much good to dairying interests.

There is a spirit of inquiry and research abroad, stimulating experiment and making observation more acute, which has never been equalled at any former time. It is this that makes such rapid strides in improvement.

At no time has there been more general or deeper interest. The American Dairymen's Association, the Vermont, the New York, the Ohio, the Wisconsin, the Northwestern, and others that have held meetings thus far this year, have been wide awake and largely attended. Their discussions have been full of thought and wisdom. May ours be no exception.

Following the reading of the annual report of the Secretary a general discussion ensued on the feeding of dairy cows, which occupied the remainder of the forenoon.

At the opening of the afternoon session an Address of Welcome was extended to the Association by Col. William Swett of South Paris, responded to by the President of the Association, after which a discussion took place on the general aspect of associated dairying in Maine, as brought out by the report of the Secretary. In the evening the subject of feeding dairy cows was further discussed.

On the forenoon of the second day, Dr. J. W. North of Augusta read a paper on the management of the butter dairy, followed by a discussion which occupied the remainder of the morning session. The afternoon opened with a general paper on the value of education to farmers, by Col. William Swett of Paris; after which one on the improvement of pastures, by C. W. Ryerson of Paris, was presented. In the evening a paper on Feeding Dairy Cows was read by J. W. Lang of Brooks.

The morning session on the third day was opened by a discussion on Associated Dairying, and the reading of various miscellaneous papers. In the afternoon, a paper contributed by O. S. Bliss, Esq., Secretary of the Vermont Dairymen's Association, was read by the Secretary, after which the annual election took place, resulting in the choice of the following officers:

President, J. R. Nelson, Winthrop; Vice Presidents, S. S. Smith, Oxford, J. W. Lang, Waldo, D. Spencer, Piscataquis; Secretary and Treasurer, James W. North, Jr., of Augusta; Trustees—Androscoggin, D. J. Briggs, Turner; Aroostook, E. E. Parkhurst, Presque Isle; Cumberland, Geo. Blanchard, Cumberland; Franklin, S. Dill, Phillips; Hancock, S. N. Kent, Bucksport; Kennebec, A. C. Carr, Winthrop; Knox, E. W. Anderson, Warren; Lincoln, L. H. Winslow, Nobleboro'; Oxford, J. K. Hammond, Paris; Penobscot, H. M. Smith, East Orrington; Piscataquis, Obed Towne, East Dover; Sagadahoc, U. A. Jack, Topsham; Somerset, Ansel Holway, Larone; Waldo, H. Murphy, Belfast; Washington, C. W. Hersey, Pembroke; York, W. S. Noyes, Saco.

A selection from the papers read and presented at the meeting is here given:

SOME OBSERVATIONS ON FEEDING DAIRY COWS.

BY J. W. LANG.

The dairy interest of the State demands investigation of the methods of feeding dairy cows. The great mass of our dairy stock are fed in old, worn out pastures, rocky, bush grown, and moss bound. The stock is wintered on late cut, poor quality of hay, rough fodder, weeds and straw. Perhaps this feed accords with the quality of stock kept in very many instances. But whether the stock be poor or good, this is not the proper method of feeding.

These are noted exceptions. We have many fine dairy cows and dairy herds, owned by liberal and judicious feeders, who use the best of early cut dried grass, meal, shorts, cotton-seed meal, and other nutritious provender.

These herds and these cows pay. Their owners are among our most intelligent and progressive dairymen. Could we place the average of the whole State up to their average, Maine would be the leading dairy State of the Union and of the world. This is the work our association is laboring to do.

Poor cows and poor feed is the bane of Maine dairying. We must have good cows and good feed, to attain success. If we can gain the point of good feed, we shall soon gain that other desired one, good cows; for none will long be content to feed poor cows at a loss. We have no doubt that if the feed of the cows of the State could be doubled in quality, that the value of their products would show a wonderful increase in quality and quantity. We cannot make much butter or cheese from swale hay or oat straw. We may feed liberal quantities of potatoes or roots, but these alone will neither give profit nor satisfaction. We cannot draw water from a cistern unless there has been a deposit made there first. We can get no water from a dry well. We must trust our cow with a generous feed before she will honor our draughts for rich and abundant milk.

If we desire animals to fat, we must feed them with fat forming foods in abundance. If we desire growth of animals, we must feed bone and muscle forming foods. If we desire milk, butter or cheese, we must feed foods containing in abundance the elements desired in the products. The foods must be prepared so as to be easy of digestion and assimilation. It must be that which nature designed, and which she prepares in her mysterious processes in the best manner. These must be seized upon, and, if need be, further prepared or preserved for use in the best manner known to scientific practice.

Dr. E. Lewis Sturtevant made to the Connecticut Board of Agriculture a report on the subject, in which he gives a summary of his conclusions, as follows:

1. That the production of butter is largely dependent on the breed.

2. That there is a structural limit to the production of butter to each cow.

3. That when the cow is fed to this limit, increased food cannot increase the product.

4. That the superior cow has this structural limit at a greater distance from ordinary feed, and more ready to respond to stimuli, than the inferior cow.

5. That consequently the superior cow is seldom fed to her limit, while the inferior cow may be easily fed beyond her limit, and as a practical conclusion, increased feed with a superior lot of cows, will increase the butter product; but if fed to an inferior lot of cows, waste can only be the result.

6. That the character of the food has some influence on the character of the butter, but even here breed influences more than food.

7. That there is no constant relation between the butter product and the cheese product.

8. That the casein retains a constant percentage, and that this percentage does not appear to respond to increased food.

9. That the casein appears to remain constant, without regard to the season.

10. That increase in the quantity of milk is followed by an increase in the total amount of casein.

11. That insufficient feed acts directly to check the proportion of butter, and has a tendency to decrease the casein of the milk and substitute albumen.

12. That the best practice of feeding is to regulate the character of the food by the character of the animals fed; feeding superior cows nearer to the limit of their production than inferior cows; feeding, if for butter, more concentrated and nutritious foods than for cheese; feeding for cheese product, succulent material which will increase the quantity of the milk yield.

The propositions contained in the first six, and the 10th, 11th and 12th of the above rules, coincides with the suggestions of the experience of most dairymen of ordinary good sense and perception who regard the matter of increasing the product per cow as not beneath their consideration. They are simply common sense rules, enunciated in the chaste, artistic phraseology peculiar to Dr. Sturtevant.

But if insufficient feed "has a tendency to decrease the casein of the milk and substitute albumen," as we doubt not it has, then it would appear that the casein has not "a constant percentage," as stated in the eighth.

Passing from this to another part of our subject, we desire to impress the fact upon the minds of all who keep cows, that breed precedes feed, but breed must be followed by feed. In brief, we must feed good, wholesome, suitable feed to good healthy cows.

In the fall of 1859, Mr. Linus W. Miller of Stockton, N.Y., happened to mention to a neighbor that he had not hay enough to winter his stock. The neighbor replied that he had wintered his cow upon a daily ration of three quarts of scalded meal, keeping her in the stall and watering her by hand, and she came out in the spring in good condition and yielded a fair amount of milk. Mr. Miller immediately repeated the experiment with a herd of twenty cows, and was so well pleased with the result that he continued the practice. In

1875 he delivered an address on meal feeding, before the American Dairymen's Association, and in 1876 explained his method at the annual meeting of the Pennsylvania Dairymen's Association.

He claims that fifty bushels of corn will keep a herd of cows, housed and quiet, as long as six tons of hay. He recommends the meal of yellow corn for this purpose, to be fed dry, two or three times a day, and insists that during their hibernation in the barn, cows do not need bulky, fibrous food, and are actually better off without it.

Last winter a committee of the Western New York Dairymen's Association visited Mr. Miller's farm, and reported as follows:

We have, from time to time, visited L. W. Miller's herd of dairy cows in Stockton, N. Y., during the winter, while being fed on meal, and after they were put back again on hay. They are, for size and general appearance, about an average lot of native cows; average live weight about nine hundred pounds. The herd fed exclusively upon corn meal for seven weeks; each animal according to its digestive capacity, making an average of about three quarts of meal per day for each cow. During this time the following points were apparent:

The cows did not chew the cud; were very quiet; did not evince any inordinate desire for food when hay was thrown them; not so much as displayed by cows that are fed on hay alone, in the usual way of feeding a little less than they will eat; were much more quiet than cows fed mostly on meal with a small feeding of hay, say four or five pounds per day. We could not discover any signs of suffering or unrest in any way whatever.

By comparing their common condition at the time of going on to meal, with their condition at the time of going back again to hay, we could not discover that they had either lost or gained in weight or flesh. Visiting them again after thirteen days on hay, we could not discover anything about them that would denote but that they had been wintered in the usual way; they were then filled up again like other cows;

their stomachs sufficiently distended for digesting hay, and were ruminating in the usual manner.

We also find that the calves from these cows are of more than ordinary size, fleshy, strong, active and healthy, and that in parturition, cases of retention of the placenta are unusually rare.

These cows have been treated in this way for several winters, at a greater or less length of time each year, and by referring to notes from cheese factory records, we discover that they sometimes produce more milk per day than any other herd; last July, for instance, being a daily yield per cow of 29 lbs. 3 ozs., or 1 lb. 11 ozs. per cow more than any other herd.

From affidavits placed before us by persons who have observed the point in years past, we find that such meal-fed cows, when turned to grass, take on flesh faster than those wintered in the usual way, other conditions being equal.

Mr. Miller has published a pamphlet of 82 pages, containing the address mentioned above, with some accounts of similar experiments by other farmers, and complete direction for the care of stock fed solely upon meal. He sends this pamphlet to any address for 50 cents, and the plan seems worthy of investigation. The estimated saving is from $5 to $20 per head, according to the relative prices of corn and hay.

Some farmers in Unity, Waldo County, are trying this system, and from report, I learn, with satisfaction. Corn meal is worth now about 70 cents. Three quarts a day for four months, or 120 days, would be 360 quarts, or twelve bushels—12x70c., $8.40. This, with a ton of hay fed during November, April and May, would winter the cow, it is claimed, better than three tons of hay alone. The $8.40 worth of meal offsets the two tons of hay, or bringing the price of good hay to $4.20 per ton. How the value of the droppings would compare with those of hay fed cows, is not stated. It may be equal in value, though far less bulky. It would seem that this system is worthy of consideration by the dairymen of Maine, who, by a few experiments, can decide its merits for themselves.

Our pastures should be renovated and improved; forage crops should be provided to lengthen them out when they shrink in feed or fail in quality. Our fields should be stocked with a greater variety of the best grasses, and these cut early and carefully dried for hay, or winter forage. Peas and oats should be largely raised to be ground into meal for the cows. Pea and oat meal is an excellent feed for milch cows. It has few superiors to fatten the pigs with that have been largely reared on the whey or skim milk.

The dairyman will be successful in proportion as he judiciously selects his cows, generously and understandingly feeds them, and carefully and scientifically manufactures his product. Good dairy products of butter will market themselves, while poor qualities are hard to get rid of at any price.

SETTING MILK FOR CREAM RISING.

BY O. S. BLISS, ESQ., SEC. OF VERMONT DAIRYMEN'S ASSOCIATION.

At this period in the history of the art of dairying, when it is constantly occupying new fields and competition is rife, when the taste and demand of the consuming classes is becoming day by day more critical and exacting, and when the common grades of dairy products are being largely supplanted by artificial products, it stands intelligent and aspiring dairymen in hand, if they would succeed, to consider well their situation and to improve their practices and products by every manner of means available to them. In the past, when every grade of products sold in the country markets at about the same price, and the margin for profit was so broad that dairying was the most profitable of all farm operations, it was not so much matter what processes were employed, success followed as a matter of course. But that has all gone by. Only the better goods, made in the most economical manner, can now or hereafter be expected to afford a living profit. This is equally true of butter or cheese, and there is much to be learned in regard to almost every process in the production of either.

There are always two stages or processes of development in every department of art. The first is always the empirical, or that dependent upon mere observation; the second is the scientific, which is based upon an investigation of the underlying principles. Dairying has scarcely as yet entered upon this second stage. The most we know in regard to the business is, that certain operations generally produce such and such results. We really, in fact, know but the A B C of the causes.

From Abraham's time to this, the practice of spreading milk out over broad surfaces for the cream to rise by the operation of the law of gravitation, has been prevalent. It has been found by experiment, thousands of times, that the best depth to set it, upon this system, was 2½ to 3 inches, and there the investigation ceased. Various circumstances, mostly accidental, have led to the adoption, to some extent, of other methods of setting. Some merely fortuitous circumstance has developed the practicability of some departure from the old method, and without stopping to investigate the causes, and find what are the real influences, the alleged discoverer has at once promulgated a new theory. Another, without regarding all the conditions which affected the results, simply because he did not know them, attempting, as he supposed, the same practice, finds it a total failure, and promptly condemns the whole thing. Thus the improvements in dairy practice have come on, a long stride ahead, and then a falling back to the place of beginning.

About thirty years ago, I first saw milk set in crocks in spring houses, in Kentucky and Pennsylvania, and heard the testimony in favor of the method. For more than twenty years I have known the Orange County pool and pail system. In the intervening time, no system has come prominently before the public which has not received my early and careful attention, so far as to hear what its advocates have had to say in its favor, and to witness its operation. Without ever having attempted an investigation of the principles involved, I became accustomed, upon the strength of the testimony of others, to recommend the method of setting milk *deep*, in cold water, until repeated instances of the failure of the system to give satisfactory results were reported back to me. This led to an attempt to eliminate from the reports of experiments which were submitted to me, and those which I from time to time found published in the papers, the conditions necessary to success by the several methods of setting. A careful arrangement of all the reports into classes, and an attempt to compare them, followed, from which it became apparent that few, if any, valuable suggestions could be deduced from them. I then began a series of original investigations, at the same time seeking to provoke through the press others to make experiments or join me in doing so. The memorable controversy in the *Country Gentleman*, during the summer of 1875, over the question of deep and shallow setting, was an outgrowth of this attempt. No important fact was drawn out by that controversy, however, but much inquiry resulted, and unquestionably much good in one way or another, and yet it is not easy to say just how or what. I have given the greater part of my time, for about four years, to this investigation, and have received much aid directly and indirectly from others. I have not the time to detail the methods of my investigations, and I shall not attempt it at this time; but shall, instead, give you only results, which may, however, be verified by practical experiment by anybody having the several appliances indicated.

My first efforts were directed toward the original method of setting in shallow open pans. This method is based upon the well-known fact that cream is lighter than milk, and will rise of itself under favorable conditions. But the difference in the specific gravity of the parts is so small that it requires considerable time for the cream to rise through a very thin layer of milk. Meantime the milk is liable to rapid change in consequence of atmospheric influences, which I need not stop to discuss here, and there is very great liability to loss in the quantity of the butter and impairment of its quality. To obviate these difficulties, various expedients have been resorted to, resulting in all the varied methods and inventions to which I shall in turn allude in the order as nearly as may be of their departure from this method.

The Jewett pan may be taken as a representative of the class of setters nearest allied to the common pan method, as nearly all the bottom coolers are mere modifications of it. In this system the milk is usually set a little deeper than in the common pans, and dependence is placed upon the air above and the water below for the reduction of the temperature of the milk and its preservation from change while the cream is rising, as in the other case, of its own levity. If the air is very cool, heat is radiated from the milk, as in the common pans, quite rapidly. If on the other hand, it is very warm, the radiation is very slow, and the entire dependence is upon the water below. But cooling from below or heating from above is contrary to the law of nature, and at best but very ineffective. But if the result sought in the construction of this system is attained, and the milk becomes cooler than the air of the apartment in which it is set, it becomes at once a condenser of the impurities and harmful germs with which the atmosphere is always charged. This is the philosophy of the often observed fact, that butter made from precisely similar milk, subjected to the same atmospheric influences, is of a better quality, and not infrequently in larger quantity, when the milk is set in a "dry pan," than when set in a "cooler pan" of the same shape and dimensions. It is impossible under this system to reduce the temperature of the milk below that of the atmosphere with which it is in contact, and much better results would be attained by cooling the air of the room first. Surface souring and several other evils attend this system, which I will not stop to discuss. The bureau or refrigerator method, in which the air is first cooled, is a very decided improvement upon this, as cooling the milk much more effectually, imparting less harmful influence to the milk from the air, and at the same time exerting some little influence upon the action of the milk and cream by surface cooling, as I shall attempt to show farther on.

A radical departure from the old pan system, was the Orange County pool and pail system. In this system, as I first knew it, milk was set 17 inches deep, in pails 8 inches in diameter, and plunged in pools so deep that the water rose higher on the outside than the surface of the milk on the inside. This is the first known method in which an actual effect was brought to bear to force the rising of the cream. A thorough investigation of the action of the milk has developed both favorable and unfavorable influences. On being plunged in the water, the milk at the bottom and upon the sides is first cooled, and an accumulation of the coldest milk takes place at the bottom. But the contact of the side of the can with the cold water, at and near the surface, causes the milk to fall downward and toward the centre of the can, thus forcing the warm milk in the centre upward, to flow outward to fill the space vacated by the falling down of the cold milk. The upward motion thus imparted to the milk in the centre of the pail or can, is believed to contribute materially to the rising of the cream; and upon this hypothesis alone the whole theory of deep setting rests. But the cooling begins at the bottom, and there is a zone of milk in the lower outside of the pail which is never subjected to the influence of the motion imparted to the milk, and it is found by application of proper tests that a very considerable part of the cream never rises from this milk. The system of cross currents at the surface is also believed to exert some little detrimental influence, although that does not yet appear to be established. Every attempt to increase the breadth of the pail used in this manner, aggravates the evils mentioned.

The famous Douglas system, which has had quite a run in Vermont, in which the pails used were 13 inches broad and 13 inches deep, is a sort of hybrid between this and the Jewett system, with all the defects of both. Mr. Douglas contents himself, perforce, with cooling the milk to 60° or 62°. If he gets all the cream from milk set 13 inches deep at 60 or 62 degrees, he must have very remarkable milk. I have never seen a case where milk could be kept sweet at that temperature long enough for the cream to rise through 13 inches of milk, unless it had been previously heated to 140°, and was then cooled at the surface instead of the sides, as by his method. The surface exposure under these methods is much less than under the Jewett or the common pan; and there is another advantage in their being generally surrounded by a more or less saturated atmosphere, on account of the presence of open water, and the product is unquestionably better.

The Hardin method employs cold air instead of cold water, and the cooling influence is exerted at the top as well as the sides. The effect is better upon the milk, and a more complete separation of the cream results. The closing of the can against the influence of the outside air, is a very great improvement upon the open can method of setting. I am on the record, in a published essay written ten years ago, as a disbeliever in the aeration and deodorizing of milk. The principal defect in the Hardin method is in the use of air for cooling instead of using the ice by direct application. It was a long stride forward in the development of a rational and philosophical method of setting milk, when Mr. Hardin begun the bold advocacy of closed cans and cold setting.

The Cooley submerged system is an improvement upon the old pool and pail system, solely in the means it affords of cooling the milk from above, and in being closed from atmospheric influences. There is absolutely no merit in the submerging, of itself, but only in that by the means the coldest water, that in which the ice floats, is upon the lids of the cans. It is a well known fact, that water becomes denser as it grows colder, till the temperature of 39.2° is reached, when it becomes less dense. The consequence is, that ice always floats upon warmer water. In the Cooley system this circumstance is turned to account with most excellent results. But the excellent results which the system is capable of enforcing when used with ice, frequently fail of attainment by reason of insufficient cooling.

The enormous waste of ice which inevitably attends all attempts to exert an intense cooling influence through the medium of water, especially where considerable quantities are necessarily employed, has induced many of those who sell it to represent that as good results can be obtained, *with more time*, from milk set at 60° or some other comparatively high temperature, as at the recommended temperature of 40°. In every case where no ice is used, the effect derived from the use of this system is not materially different from that derived from the old pool and pail system, slightly intensified by the cooling influence being extended over the cover. Every system must be judged by the effect which it actually produces when operated in the manner to which it is best adapted, rather than in the manner, in which at whatever cost and labor, it is most effective. Judged by this standard, this cannot take high rank among the useful inventions of the day.

Mr. Edward Burnett's system of setting milk for cream, is an improvement upon both Hardin's and Cooley's systems. He uses pails larger at the top, thrust down through the bottom of a trough in such manner as to expose but eight inches of the upper portion and the cover to the cooling influence. Around this he holds the drip from the ice, which occupies a movable box above, and places broken ice in it. The water thus placed in contact with the sides of the cans, is kept cool by the air in the space between coming in contact with the water and the ice alternately. The lids of the pails are also subjected to the influence of the cold air. He employs cans enough to set two milkings, one of which is covered with his movable ice box at a time. The necessity for packing his pails and movable box, to keep them air and water tight, and other details of construction, render this an expensive arrangement, and quite likely to get out of repair. But of all the methods of raising cream, thus far considered, this is the most effective and the most philosophical. The cooling is from near the top, as it should be.

Thus starting out with the old method of cream rising by its own levity, and in its own way and time, we have approached, step by step, a truly philosophical method of cream raising, in the practice of which the wayfaring man though a fool need not err. My own system, the fruit of long and thorough study of principles, and a familiar acquaintance with all others, is similar to Mr. Burnett's in the use of the tapering pail, not from necessity in packing it at the bottom of the trough, but because I believe it more convenient and less liable to retain the cream in the bottom. It differs from his, in that my pails set their whole length through the bottom of the ice chamber, so that the lids of the cans are on a level with it, making a plain surface upon which ice is placed. No effort is made to hold the drip from the ice, but it is suffered to drop down beside the can lids into the tank below, on the bottom of which the cans rest, and then to flow away at its leisure. In this system the ice is applied directly to the lids of the cans themselves. The effect is, that the surface milk is first cooled and falls directly to the bottom of the can in a straight line, and forces up another portion in precisely the same manner. No currents of any kind are formed, but every particle of the milk is cooled precisely in the same manner and to precisely the same temperature, which is not effected in any other known method of setting or cooling.

The well established fact that cream rises best with a steadily and constantly falling temperature, is taken advantage of and turned to the best account in this system. To adapt this system to the use of those parties who have cold running water, a system of pipes is arranged in the top of the ice chamber through which water may be forced upon the lids of all the cans simultaneously. The water then trickles down the sides of the cans into the tank below and passes off. No partially warmed water is retained in or about the tank, but fresh cold water is constantly delivered upon the top where it will do the most good. Water and ice are never used at the same time, but when the milk is cooled as low as possible with the water, that is shut off, and dry, cold ice is placed directly upon the can lids, where one pound will cool more milk than two will floating in water. No expensive tank or ice box is required in this system. A dry goods box made so close as to protect the ice from undue exposure, is just as good as the best refrigerator, just so far as it protects the ice.

IMPROVEMENT OF DAIRY STOCK.

BY S. T. FLOYD, WINTHROP.

Laboring men have little time in which to listen to fine speeches. We are supposed to be all practical cattle breeders and dairymen; therefore, if the few ideas which may be contained in this paper shall have the merit to be approved by you as containing some practical common sense, it is enough.

Several years ago a few individuals, who had come to realize the great benefit we were deriving from the importation of dairy stock from the Jersey Islands, formed an association, as you well know, to keep the blood pure from other breeds. It was, and still is, no easy task, for there has always been a disposition in this country to cross *down* the best individuals of all varieties of cattle in the country, till each breed loses its individual characteristics, and a breed is produced that is really inferior to the poorer one at the start. Occasionally the good blood crops out and produces a cow of superior dairy qualities, whose wonderful productions are sure to be chronicled in the agricultural journals of the day; but these are always exceptions. Now, I do not propose to quarrel with the framers of our government, so much as to say all men are not born equal, but I do say, without fear of successful contradiction, that all breeds of cows are not equal, and if we would have a distinct race, which shall excel for dairy purposes, we must keep the Jersey blood pure.

I offer this as my first and most important proposition, because the fact is so apt to be winked out of sight. There is a disposition in this country to ignore "blood"—perhaps it comes partly as the fruit of our republican education. The English, who divide their human population into classes, or castes, with the rigid laws of society forbidding amalgamations, have also their pure blood race horses, their Shorthorns, their Herefords, and even their dogs, that boast of their pure ancestral blood, while almost everything in this country is mongrel, a "cross," or a *grade*. And the result is, we have but little in the stock line that we can depend on for definite purposes. Indeed, we often hear farmers of the old school remark, "A good cow seldom produces a calf that will make a good cow." The very natural result of this American mania for crossing breeds. Therefore, I say the first rule to be observed, if we would improve our dairy stock, is to keep the Jersey blood separate from and unmixed with any other.

Next to thorough breeding is the judicious selection of animals to breed from. An ill-bred thoroughbred is the greatest hindrance we can possibly have to the improvement of Jersey stock. "Always select the most perfect for propagation," is a law so natural that the father almost forgets to teach it to his children, yet this very law which we would observe with the utmost punctuality in matters of trivial importance, we may slight in this matter of raising pure blood dairy stock, as it is universally conceded by all experienced dairymen that the sire has as much, and often more, to do with transmitting dairy qualities to the offspring than the dam; and as we have a great variety of male calves to select from, it seems hardly necessary to say that none should be allowed to live beyond the veal age except those from mature parents, and the dam of which has earned an honest reputation as a superior dairy cow. But there is one other point to which I wish to call your attention; that is, the imperfect heifer calves of this breed that are sometimes raised. Whether from breeding "in-and-in" in the past, as has always been practiced by thoroughbred breeders more or less—or from the fact that the males are inclined to be vicious and are seldom allowed to live till they come to maturity, so that for generations the rule has been to breed from very young ones, or that we milk the dam, frequently, the year round, and require her to produce a calf besides, are causes that would be merely matters of opinion, and the limits of this paper will not allow me to discuss them—yet the result of some abnormal conditions we do not see in Jersey heifer calves. Sometimes with only three teats, sometimes with only two, and more frequently with four so very small that they resemble the old schoolmaster's noun, which he said had a gender so very small it was hardly perceptible, and he did not know whether it belonged to the masculine, feminine, or neuter class.

You ask what practical means shall we adopt to improve dairy stock, and I answer, kill all such calves while they are calves; do not let one live to disgrace the splendid dairy herds that are destined to be the pride and wealth of the farmers of Maine.

We will suppose now, that we have got rid of all the little, mean, weak, scallawaggy calves, and are ready to start to raise those only of the most perfect type. These frequently come in cold weather, and care should be taken not to let them get chilled before the first meal; after this there will be but little danger; and to prevent this it will be necessary sometimes to milk a little in a dish and force it into the calf's mouth before he has strength enough to stand, which will act like magic in giving him strength to rise and help himself. The first milk of the cow warm from the udder is really necessary to the health of the young calf; hence many leave it with the cow for the first three days. I would in no case leave it or let it suck longer than that, unless it be sometimes to reduce the swollen udder of the cow.

The calf taken from the cow and taught to drink (which they usually do when fairly hungry), the next question which naturally arises is, what shall we give them to drink? In answering this we must consider well what can the calf's stomach best digest; for all know, though but few really act on the principle, that it is what is digested and turned into blood, rather than what is swallowed, that goes to the sustenance of man or beast. For the first two or three weeks, then, we say feed new milk; it is the natural food, and it will not do to diverge from nature too abruptly. After this the cream can be taken off at twelve hours old, and soon at twenty-four, taking care to supply the defect by adding something to keep it from coagulating too hard in the calf's stomach, so it cannot be acted upon by the gastric fluids.

We have all noticed that a calf drinking takes its food much quicker than when drawing it from the udder in the natural way. It has but little time to prepare for digestion while being swallowed. To remedy this evil, some have, and with good results, mixed a small quantity of warm water with the milk before feeding it to very young calves. My own experience has taught me that a calf should have nothing more than milk, or milk and water, until it is at least three weeks old, after which a small quantity of oil meal, shorts or oat meal may be scalded or cooked and put with its milk.

And here I wish to refer again to the very important fact, because at this stage of the calf's growth it is more likely to be overlooked, that *it is what the calf digests that makes it grow.* Very young calves are often injured by kindness, old ones by neglect. We should remember that the natural food of the calf for the first three or four months is principally milk in its natural condition. If we change from that, care and prudence must be exercised if we would keep the young animal healthy and in a growing condition. Over-feed is almost sure to bring on scours, and a continuation of too much feed will cause it to become chronic, which will render a calf worthless. Fasting is the best remedy for the disease, and one which in the experience of thirty years I have never known to fail.

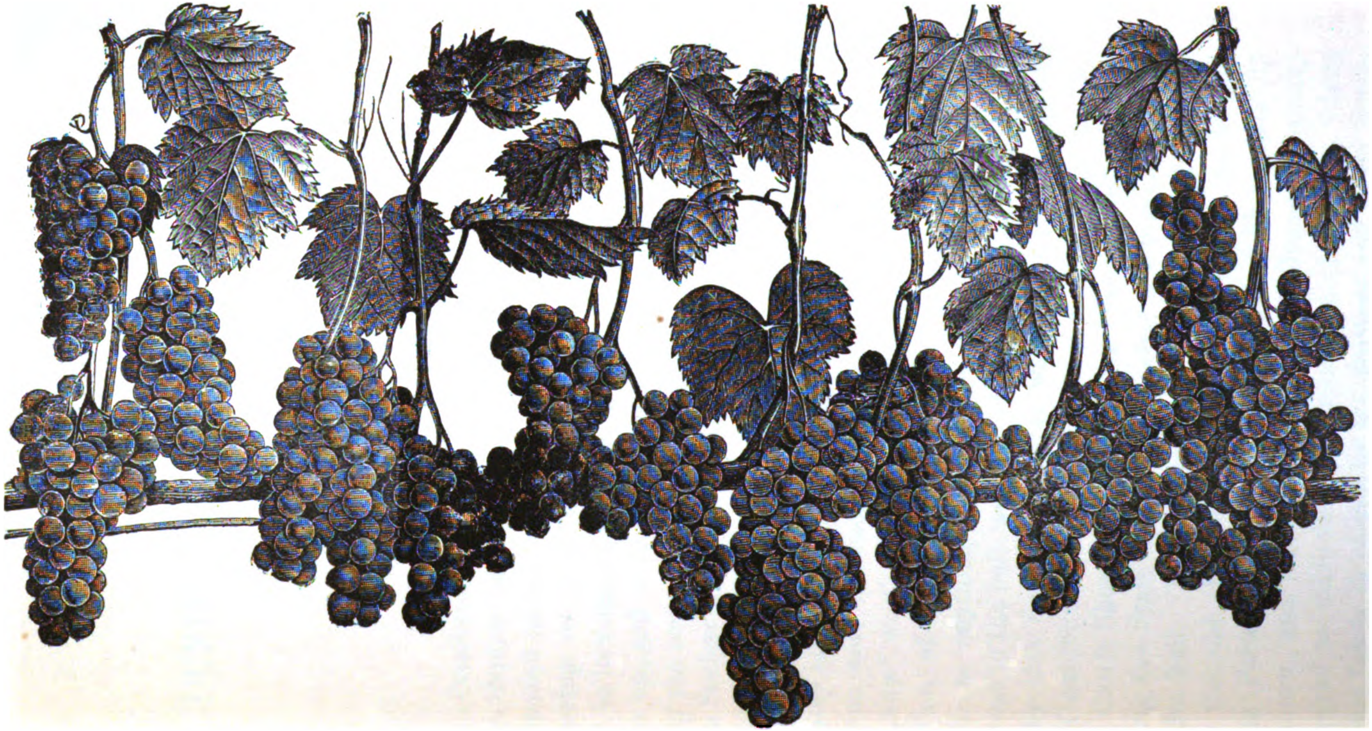
Next to milk comes fine, early cut, well cured hay, which the calf will learn to eat when very young, and the man who has plenty of it need not be in a hurry to turn his calves out to be exposed to the hot sun and the torment of flies, indeed, many good breeders of stock do not turn to grass until the second season, or till the animal is nearly one year old; but whether kept up to hay or out to grass, some kind of provender should be fed to it every day till one year old—the second summer it will do well as a rule, on grass alone.

I now come to the fourth proposition, which is special care in feeding the heifer the few months previous, and next to producing her first calf. Because a yearling heifer is usually rugged and has a good appetite, she is generally turned off with the coarsest fodder, while all the meal or shorts, or beets and turnips are fed to other animals. Now this is all decidedly wrong. There is no stock in the barn, not even your favorite Jersey cow, that "makes her two pounds of butter a day, and can make three," that would pay so well for good, generous feed, as this same Jersey heifer.

When the udder begins to grow, feed on something that will stimulate its growth. It is the time the character of the cow for milk is being formed, and of course a very important time, if we would improve our dairy stock, so I say at this stage feed liberally, feed constantly, and feed on something that, if she was a cow would make milk, not much corn meal, but shorts and roots and good hay. This generous feed should be reduced, sometimes very much, and always some, just before and after producing the calf, until all fever has subsided, when it will be safe to begin it again gradually, and in two or three weeks put back again on full feed. We imagine her to be a heifer only two years old, giving milk, with every bone and muscle and milk organ undeveloped. Do we ever stop to realize what a tax there is on the constitution of the future cow? Nearly all the food goes to the milk organs, and the frame that carries them usually stops growing for a year or two, when from the scanty feed which the animal gets, its nature will begin to appropriate a little for its own growth; but seldom enough with the feed which we give to fully develop the cow.

Now, we cannot afford to let our heifers grow until they arrive to the full size of cows before coming in; it would not be practicable; but we can afford to feed better. So my fourth proposition ends with the advice, feed better. Feed to develop your cows, feed to improve your dairy stock; feed that which will make bone, and muscle and milk.

I have thus taken up the four points of this subject, which I consider the most important, that is, pure blood stock, well bred stock, care of calves, and the development of dairy cows. Meanwhile, experience has taught us that our dairy stock is susceptible of great improvement. We have only to cast the mind's eye back to the little insignificant creatures first introduced among us and called Jersey cows, and often pointed at and sneeringly called *goats*, yet with the right blood in the veins, and compare them with some of the herds of eight, ten, or twelve pure blood Jersey cows which we now have, and which their owners will tell you they know by actual figures pay one hundred dollars a year, and often more than that for their care and keep—to see that it pays, yes, *pay*, that is the word we Yankees like, to take care of and feed dairy stock.



SECTION OF ORIGINAL VINE OF THE BRIGHTON GRAPE. Growing on grounds of H. E. HOOKER, Rochester, N. Y.

COUNTY AGRICULTURAL SOCIETIES.

PENOBSCOT COUNTY.

BY B. A. BURR, SECRETARY.

The Penobscot Agricultural Show and Fair was held at Orono, September 18th, 19th and 20th. The first day of the Fair opened under rather unfavorable circumstances, a heavy rain having set in at five o'clock in the morning, which continued to increase until about eight o'clock, when it began to lighten up, and before ten o'clock had entirely cleared off, causing the countenances of the Trustees, who had advanced for the Society quite a large sum of money, to brighten; and the citizens of Orono and vicinity began to bring their specimens of field and garden crops into the hall. Before noon the entry clerks had all they could attend to. The citizens of Orono were not backward in their endeavors to make the "hall show" worthy of the patronage bestowed upon it. The exhibition of potatoes, corn, and garden vegetables, was superior to anything ever seen in this vicinty; in fact, the exhibition in the hall was one of the most satisfactory ever given by this Society, and was well patronized during the days of exhibition.

The Cattle Show was held at the Orono Trotting Park, adjoining the State College farm, being a few minutes' walk from the hall. The Trustees, several weeks before, purchased the old sheds and buildings erected at the Bangor Trotting Park for the State Fair, and had them carefully taken down, and a few of the citizens of Orono generously volunteered to take them to Orono free of expense, where they were taken in charge by the trustees and again put in shape for comfortable quarters for the cattle, horses, and all other live stock brought for exhibition. The owners of the park put the seats on the stand and their stalls for horses in good repair. But for the unfortunate shower on the morning of the first day, this would have been the most satisfactory and profitable show ever given by this Society; and even as it was, a goodly number of excellent animals were on exhibition. An unusual number of fine horses were entered, and on the whole the patrons were well pleased with the exhibition.

At two o'clock on the second day, the St. John's band of Bangor put in an appearance at the hall, where, after playing a few lively airs, they proceeded to the street and accompanied the Coburn Cadets, Prof. Hills commanding, who escorted the speaker of the day, and the officers and members of the society to the park grounds, where the address was delivered by Prof. M. C. Fernald of the State College,—having for his subject "The Margin of Profit," a plea for more intensive culture in farming. The address occupied about forty minutes in delivery, and was listened to with the closest attention throughout. No report short of the full text would do justice to the speaker. He showed that it is only by high culture and by liberal expenditures that satisfactory returns in farming can be received. The laws of plant nutrition must be observed, and we must literally feed the plants. Farm accounts should be kept, to ascertain whether the business is a prosperous one. The manufacturer who fails to calculate within a tenth of a cent the cost of the cloth he makes, or the merchant who fails to show by his books how his business is carried on, invites financial disaster. The question is, do ordinary soils furnish the constituents necessary to the production of full crops? Iron, soda, magnesia and chlorine are generally in full supply. Nitrogens, potash, and phosphoric acid are the elements usually lacking. These must be furnished in quality and condition ready for assimilation and use. Plants will not continue to grow after the necessary amount of potash is exhausted, hence we see the folly of exporting ashes, which should never be carried off the farm, because they contain the elements most generally needed on all soils. Plants do not live by eating, but like too many men they do live by drinking, hence the substances furnished should be in a soluble form, to enable the plant to take them up; otherwise the chemical food, though found in abundance by chemical analysis, may not be in condition to be taken up, and is therefore useless. The waste heap should be drawn upon liberally, and its lack supplied by outside sources as means will permit.

The exhibition of fruit was a credit to the society and exhibitors. The exhibition of corn was never before equalled in this vicinity; and, taking the crops together, they bore evidence that our farmers have every reason to return thanks to the Giver of all good for the bountiful returns of their labors the present season. The receipts of the three days were as much, if not more than could reasonably have been expected. The matter of offering so large a variety of premiums, which amount to so much in the aggregate, will probably receive the serious attention of the Society in the future. It is hard to find members who are willing to take the responsibility of offering $1,000 or more for premiums, besides incurring a debt of several hundred more for the necessary expenses of running the fair, without a cent in the treasury to back them up in case of unfavorable weather. We are of the opinion, that the Society should abandon this reckless manner of doing business, and offer substantial premiums for most important crops and the best breeds of cattle, and employ disinterested experts for committees—the less in number the better—and pay them for their time, with instruction to examine every article exhibited, and make favorable or unfavorable mention, according to their real merit, awarding to the articles for which a premium is offered, the premium, if they come up to a certain standard. In this way neither the exhibitor nor the public would be deceived. Many farmers exhibit animals which they really believe to be superior because they are the best in their neighborhood; when a good judge would not take them as a gift.

There was no premium offered for horse trotting. Not, however, because the trustees were opposed to the excitement and exhilaration of a horse trot, honestly contested, for they can see no harm from testing the speed of the horse, nor was it from any lack of admiration of this noble animal, but because they could not perceive any logical or moral relation existing between a horse trot and a farmers' show of cattle and vegetables. Brawling peddlers, or "side shows," were not admitted to the grounds. The best of order was maintained throughout the exhibition, and no arrests were made for drunkenness or other misdemeanors. In all probability the exhibition will be held at the same place next year, as the Society's buildings remain in good condition. The Society was well pleased with their treatment by the citizens of Orono.

AROOSTOOK COUNTY.

By J. Frank Holland, Secretary.

The Annual Exhibition of this Society was held at Houlton, on Thursday and Friday, September 27th and 28th, 1877. The entries were less in number than usual, but in most departments there was still a good showing of fine stock. This lack of more numerous entries was readily accounted for in the general thin condition of average stock, after passing through the almost unprecedented drouth of the past summer.

As a rule, Aroostook County is happily exempt from any severity of summer drouth, and during a residence of eleven years, the past season was the first in which the writer has seen any considerable evidence of drouth, either in paling the rich green of wood and fields or stinting the growth of vegetation. This season, however, has made a large shrinkage on the hay crop, though it is also conceded that the smaller quantity is relatively much more valuable than the rank, bulky, growth of a wet season, and there will be no general scarcity, if but small surplus for shipment. A considerable acreage heretofore devoted to oats, was this year given over to potatoes, so that this grain crop, shrunken both by lesser sowing and the drouth, is relatively small, and in place of being shipped abroad as usual, oats are now being brought here somewhat from the West for use in lumbering operations, (and for the first time, probably.)

The wheat crop is believed to have been universally successful, and is now increasing from year to year, since its success has again become reasonably certain in the absence of the weevil. The great success and high prices of the potato crop of 1876, induced the planting of a very large acreage this season, and with a yield similar to last year, the product of Aroostook must have been enormous. But no ravage has yet been made here by the dreaded "Colorado beetle," which, indeed, has only been found in few and perhaps not entirely authenticated instances, and in spite of tho unfavorable season a very large crop has been harvested, the numerous starch factories of the county have been crowded to their utmost capacity, and an ample surplus stock remains, which our dealers and shippers are gradually collecting in and freighting to Boston, in which market prime "Houlton starch" commands a preference over all others, that is recognized in the quotations of the price current circulars of the commission merchants. The cultivation of garden crops was highly successful and satisfactory, as was evidenced by the fine specimens exhibited in connection with the products of the dairy and loom and fancy work, in every variety and department.

The closing address was delivered by Rev. Thomas Kinney of Houlton, and was alike brief and practical. There was no horse trotting in connection with this exhibition.

NORTH WALDO SOCIETY.

By C. E. Smith, Secretary.

The Seventeenth Annual Fair of the North Waldo Agricultural Society, was held at Thorndike Station, Oct. 4, 1877.

The day opened cloudy and a heavy mist prevailed in the morning, lasting until nine or ten o'clock, so that the best and most encouraging feature of our "fairs"—the ladies—were slow in putting in an appearance. But about noon the sky assumed a more encouraging aspect, and the grounds presented a very animated appearance. There being no admission fee to the grounds (we having no horse trot to maintain) the stock was very generally examined. In the hall, where admission was charged, there were as many as could comfortably inspect the articles displayed, and most of the time more than it could easily accommodate.

The display in the hall was better than for many previous years. The show of corn, instead of two or three traces, consisted of some ten or more beautiful samples, one trace being some six feet long, of the "King Phillip" variety. There has been so little interest in corn culture in our limits, that but few know what variety they plant. I think there is a change for the better taking place among us. Some who have not raised their own corn for years, will nearly or quite do it this year. There are many thousand bushels sold at Thorndike Station every year, but I hope those thousands of bushels of western corn brought here, will grow "beautifully less" ere another decade. The wheat shown was not a just representation of wheat culture in our section, many of our good wheat growers not putting in an appearance. I could enumerate several who raise from 75 to 125 bushels each year, who "failed to connect." What we want is so large a number of competitors in this and the other classes, that it will be embarrassing for a committee to decide who shall be first. Wheat culture has received a stimulus in this section, and farmers are awakening to the fact that they can raise their own bread.

The display of vegetables was fine. Beets, of which four completely filled a five peck basket, turnips, &c., in proportion; squashes, weighing 80 lbs., and other things in the same department which did credit to our fair, and show a spirit of kindly emulation among those competing for the premiums.

The array of stock on the ground was not as good as it would have been had the day opened more propitious, many from a distance fearing to start their herds. Coffin & White, famous for mammoth oxen, did not drive but few herds, on account of the wet. Nevertheless, the display was a creditable one, and was pronounced a success by all. R. M. Oliver exhibited a pair of four years old steers, 7 feet 4 inches girth; also a pair three years old, 7 feet girth. P. W. Ayer, a pair two years old, 6 feet 6 inches girth. A. D. Banks, Fred Cates, Parish Dyer and others, exhibited splendid oxen, girthing 7½ feet and upward. C. E. Swett a pair of steer calves, 4 feet 10 inches in girth.

We have, within our limits, the material to make a first class show, if it could be brought together. Coffin & White have several times taken the first premium at the State Fair, and raised the second largest pair of oxen ever raised in New England. P. W. Ayer has taken the first premium on his thoroughbred Shorthorn bull "Knight of Geneva," for a series of years at our State Fairs, and this fall, 1877, distanced all New England. R. M. Oliver took the first prize at the State Fair on 4-year olds; also a premium on 3-year olds. Besides these, other breeders have won premiums at State and New England fairs.

Of the thirty-seven societies in the State, twenty-two have enclosed grounds. One disadvantage under which we labor is, that we are dependent on some "neighboring field" on which to hold a fair. When we do not make some arrangement with the trotting association, we cannot take fees at the gate; and when we do, it takes off the profit. What we want is enclosed grounds, and the only way to obtain these is to purchase, or obligate ourselves to occupy a place which we may enclose, at a reasonable rate, for a series of years. But without attempting to solve the problem, it is a plain case that we need enclosed grounds.

The agriculture of our section is advancing with steady strides. The gradual development of advanced ideas, and the more general application of scientific principles to farming; the slow yielding of old notions as new actors come on the stage; the more general diffusion of a practical knowledge of agriculture among the young men, and the sure dispelling of the hateful and erroneous idea that farming is a degrading vocation, bespeak a bright future for the agriculture of the old "Pine Tree State." The advent of the mowing machine has done more to stimulate the improvement of our farms, than any one thing. The clearing of fields of stumps and rocks is of necessity a work of time, but the amount of such work done in our State in the last seventeen years is simply enormous. The saving, protection and application of manure, is another subject which is engrossing the attention of the tillers of the soil. A few years ago the idea prevailed that manure was not suitable for use, unless it had lain and leached one year. Now the quicker it is applied to the soil, the more remunerative the returns.

WASHINGTON COUNTY.

BY H. F. PORTER, SECRETARY.

The Annual Cattle Show and Fair was held on the Agricultural Aid Society's grounds, in Pembroke, September 26th and 27th. The weather on both days was remarkably fine. Entries of stock continued to be made till 12 o'clock on the first day, when it appeared that there had been a total of 214 entries made; and some of the animals for the show were driven a long distance. The Jersey blood appears to predominate in dairy stock; many fine thoroughbred animals of that breed were shown, and a large number of grades. A few

Durhams and Ayrshires were shown among cows and young cattle; also a thoroughbred Hereford bull and heifer, aged respectively six and ten months, and owned by C. F. Todd of Milltown. There were only five flocks of sheep, and but a small exhibition of swine, but the specimens were good types of the Chester and Berkshire. There were but few competitors in the poultry show, a majority of the breeders deeming it too early in the season to exhibit poultry to advantage. A large number of horses and colts were shown, not many of them remarkable for size, speed, or symmetry. The stallion Tom Patchen, Jr., owned by Jno. McMorgan & Co., Pembroke, drew the first premium.

Three hundred and nineteen entries of crops were made, against 246 in 1876, 243 in 1875, and 129 in 1874. The specimens of nearly every crop shown were of superior quality, and in many cases it was with difficulty that the awarding committees could determine to which article the award should be made. The whole number of entries in manufactures was 217. In this department the quality of the articles was fully equal to those exhibited in the past.

The present has been a poor fruit year in this section; but, notwithstanding that fact, there were some nice specimens of cranberries, grapes, pears, apples, and crab apples displayed at the fair. The hay crop was fair in quantity and of excellent quality, and was secured in good condition. Potatoes did not yield so abundantly as last year, but a larger acreage planted has made the aggregate crop about the same as in 1876. A larger area of wheat was sown in Washington County this year than for many years past, and is reported to be an excellent crop in quantity and quality also.

The Society has paid in premiums the present year $515, and has means to meet all its liabilities, and some funds to invest in the stock of the Agricultural Aid Society. It is the design of this society to buy in all the stock of the Aid Society, and thereby come in possession of the grounds and hall where the annual fairs are now held, and which cost the society an annual rent of $200.

YORK COUNTY.

BY W. S. DENNETT, SECRETARY.

The Thirtieth Annual Exhibition of the York County Agricultural Society, was holden at Biddeford, on Tuesday, Wednesday, Thursday, and Friday, October 23d, 24th, 25th, and 26th, 1877; and although the weather was cold, and a part of the time stormy, yet there was a very fine display, both in the hall and on the show grounds.

The vegetable and fruit departments were well filled, and presented a fine display, both in quantity and quality. The general report from the county is, that the fruit crop was almost a failure; but judging from the appearance of the specimens exhibited, one would suppose the crop to have been bountiful.

The ladies' department was completely successful in every respect, the space allotted them being fully occupied with a very superior class of articles, and their arrangement being perfect made a very attractive feature of the exhibition.

The entries in the dairy department were not very extensive in number, but were excellent in quality. It being very stormy on the day preceding the opening of the fair, the "back towns were not heard from," as they undoubtedly would have been had it been pleasant.

The exhibition of stock and poultry was very fine, and embraced some excellent thoroughbreds, working oxen, &c. Horses and colts were well represented by several very fine stock horses, a large number of brood mares, and colts of all ages; also, a very fine showing of speed in the following classes: 3-year olds, 4-year olds, 2.50, 3 minute, and sweepstakes. On the whole, the exhibition was a success, and productive of much benefit.

AROOSTOOK AND PENOBSCOT UNION SOCIETY.

BY LUTHER B. ROGERS, SECRETARY.

The Annual Exhibition of this Society was held on the 20th and 21st days of September. The show of cattle was small, and the cattle were rather thin in flesh, but showed a marked improvement in the young animals. The number of full blooded bulls was quite large, there being representatives from the Durham, Hereford and Jersey breeds.

Our farmers show a good deal of interest in the improvement of their neat stock and sheep. There are some fine flocks of sheep and full blooded (or nearly so) Leicester and Cotswold bucks owned within the limits of the Society, but owing to the small premium offered they are not put on exhibition. Good judges say that we have as good, if not better sheep, than can be found in any part of the State.

The ladies' fair was very good, reflecting great credit on the committee of ladies who had it in charge.

The second day of the fair partook of the nature of a farmer's holiday. After listening to an able address, delivered by Rev. E. Skinner, the Society were escorted to the hotel of Mr. C. L. Hackett, where a sumptuous dinner was in waiting, which in due time was fully discussed, to the evident satisfaction of all present. In the afternoon the horse trot came off; which, if it did not record speed higher than Goldsmith's Maid, drew a large crowd and developed a good deal of interest. After listening to the reports of the various committees, the good farmers and their families dispersed to their homes well pleased with the entertainment, and we hope with a resolve that they would, another year, do something to help along the good cause. We think that the time and money is well expended, if in nothing else, in getting the people together once a year, and letting them look each other in the face, and in having a good time generally.

The crops were rather light in this section, with the exception of wheat, which, owing to the large area sown, was quite large and of good quality. We have come very near raising our own bread, which can be easily done. In fact, there are a large number of farmers who have bought no flour for years. I have heard of no large yields per acre, but the average crop was good. The drouth in the earlier and middle part of the season affected most all our crops—buckwheat, potatoes and oats, and especially the pastures. This would in a great measure account for the leanness of our cattle on exhibition. Corn generally ripened, and was more than an average yield. This crop is considered by our best farmers to be almost a sure crop with us, yielding from thirty to fifty bushels per acre, and in some instances as high as one hundred to the acre, (for proof, reference may be had to Mr. A. Cushman, Sherman). Our season was very favorable in the fall, we having no frost to injure the crops until late in October; cattle getting their living almost wholly in the fields until the middle of November.

We are to have a starch factory next season, from which our farmers hope to make something, out of raising potatoes at twenty-five cents per bushel. We think our section offers good inducements to those men who wish to make for themselves homes and farms, and are willing and able to work and keep doing so; there being plenty of wild land to be obtained at fair prices, with good roads, schools, and markets near by.

LINCOLN COUNTY.

By J. J. A. Hoffses, Secretary.

The Twenty-Third Exhibition of this Society, was held at the Jefferson Trotting Park, Jefferson, September 25th, 26th and 27th, and was a good success. The weather was all that could be wished, and the attendance was good. The display of stock was fully up to former years. Some very fine thoroughbred stock was exhibited, fully demonstrating that the farmers are awake to their interests in this much needed improvement. The show of field crops was not up to last year, although some splendid specimens were on exhibition. The severe drouth of the summer lessened the yield of crops very much. Corn was fair; potatoes not an average, and in some localities they rotted badly; apples were nearly a failure, but we had a large display at the fair, and the wonder was where they came from. The dairy was well represented.

The Hall was well filled with household manufactures, needle-work, fancy articles, flowers, pictures, and other articles both useful and ornamental, and reflect great credit on the ladies who contributed to get it up.

WEST PENOBSCOT SOCIETY.

By T. P. Batchelder, Secretary.

The Twenty-Third Annual Cattle Show of this Society was held on the Society's grounds in Exeter, September 25th, 26th and 27th, 1877. The weather was warm and pleasant, the attendance large, and the receipts very satisfactory.

The show of live stock was full an average of former years. The neat stock department was very full, showing fine specimens of Jerseys. Many good oxen and steers were on the ground, and the sheep, swine and poultry were well represented. The horse department was well filled and made a fine show.

In the Hall the domestic manufactures, fancy articles, needle-work, &c., made a very fair display. Mrs. Hall Bagley of Charleston, aged 78 years, exhibited twenty-one different articles of her manufacture, consisting of many substantial goods, among which were several pieces of woolen and cotton and wool flannels, linen, &c. The display of dairy products was very good, and the show of fruit was exceedingly good considering that the crop was almost a total failure.

The specimens of crops were very large and fine. D. D. Dole of Exeter, reports one acre of corn planted in drills three feet apart, and the corn three inches, one kernel in a place; product 178 bushels ears of sound corn—from another acre, 72 bushels wheat. Levi Stevens of Exeter, produced from one acre 34½ bushels wheat, and from three acres 125 bushels oats. C. I. Grinnell of Exeter, produced from one acre 29½ bushels wheat, and from another acre 140 bushels potatoes. E. L. French of Exeter, produced from one acre 170 bushels sound potatoes. Leonard Skilling of Garland, produced from one acre 48 bushels oats.

NORTH KENNEBEC SOCIETY.

By A. L. McFadden, Secretary.

The Annual Show and Fair of this Society was held Wednesday, Thursday and Friday, September 19th, 20th and 21st. With the exception of a slight shower Friday afternoon, the weather was all that could be desired, and everything passed off in a manner satisfactory alike to the exhibitors and the officers of the Society. The number of entries at the hall and grounds was large, the attendance very good, and the receipts exceeded those of previous years. This, in a great measure, was due to the efforts made by the President and Trustees of the Society, to make the Show and Fair of 1877 equal to any the Society has ever held, in which undertaking they were successful. The expenses were somewhat larger than usual, owing in part to the engagement of a band to furnish music at the hall and grounds. While we think it is pleasant to have music at the exhibitions, we do not think the benefit derived equals the expense incurred.

The first day at the grounds was devoted to the exhibition and examination of neat cattle, sheep, swine and poultry.

The exhibition of thoroughbred stock was very large. Herefords from the farms of H. C. Burleigh, J. S. Hawes and William P. Blake; Jerseys from Dr. N. R. Boutelle and J. H. Hanson; Durhams from Howard & Ellis and Levi A. Dow—all received the attention they deserved, and fully sustained the reputation these gentlemen have for keeping and breeding none but the best. Competent judges say this show of Herefords, Durhams and Jerseys was fully equal to the same breeds at the New England Fair, in quality if not in quantity. A thoroughbred Holstein bull, exhibited by John Cornforth, attracted much attention, as he is the only one within the limits of the Society.

In drawing oxen, A. J. Libby, as usual, carried the day, he entering five pairs; among them a pair five years old, which received the praise and approbation of all who were so fortunate as to see them move the heavy load to which they were attached. It would be difficult to find their match in the State. E. Totman of Fairfield, exhibited a grade Jersey cow, winning the first premium as a dairy cow. She is considered by good judges to be the best dairy cow within the limits of the Society. J. H. Hanson was awarded first premium on his thoroughbred Jersey cow, "Minnette."

The show of sheep was the finest for years, the long and middle wool predominating. The Southdowns were represented by the flock of Dr. N. R. Boutelle and H. C. Burleigh, and Cotswold by J. S. Howes, who has as fine a flock as there is in the State. The fine wools were from the flocks of A. G. Ricker and H. A. Archer. The show of swine was small, the principal exhibitors being H. C. Burleigh, J. S. Gifford and S. C. Watson. One of the most interesting features of the exhibition, was the poultry—fifty coops being shown by Dr. G. M. Twitchell, E. R. Mayo and E. A. Cilley of Fairfield, and by C. K. Mathews, W. M. Dunn and A. L. McFadden of Waterville. The poultry interest is increasing within the limits of the Society, and since the formation of the Central Maine Poultry Association at Fairfield, more pains are taken to improve the stock and breed only from that which is pure, believing in the end it will pay better to keep only pure blooded fowl, and do away entirely with the "mongrels."

Of horses the show was good—Knox stock predominating—"Dr. Franklin" owned by E. J. & G. W. Lawrence at the head, followed by William Jepson's "King Phillip," both very fine animals, who have done much to improve the stock since the departure of the old Gen. Knox from the State. There was the usual show of colts and breeding mares, and generally speaking the exhibition of horses was fully up to the average.

The fair at the hall was a complete success, surpassing any previous display since the Society was organized. Among the largest exhibitors was the "Lockwood Company," who made a fine show of bleached and brown cottons of their manufacture. G. A. Phillips & Co., and Paine & Hanson made a good exhibit of stoves and hardware, and Joseph Taylor of Belgrade, made his usual fine display of fruit, winning the Society's first premium. The show of vegetables was very good, but not large—the hall was well filled with contributions from the people of Waterville and adjoining towns, and taken together they made a display of which they and the Society may well feel proud.

WESTERN PISCATAQUIS SOCIETY.

BY W. R. THOMBS, SECRETARY.

Our Annual Show and Fair was holden at Monson Village, on Wednesday and Thursday, September 26th and 27th. The weather, with the exception of light showers, was favorable, and our exhibition in most of its departments was about an average of the last four years. One marked deficiency was the less number of oxen, not enough from any one town to make up a respectable team; but we hope to see more of these useful animals in future, as there was a fine display of three year old steers, one lot of eight pairs from the Shaw Brothers of Greenville. The horse department was well represented by some good horses and a large number of colts.

In the ladies' department in the hall, there was some falling off compared with former years. How is this, ladies? Have you become weary in well doing, in exhibiting specimens of your handiwork, or your nice butter and cheese?

The hay crop hereabouts was much below an average. The latter part of the hay season with us bad weather prevailed, and much was housed in damaged condition. This necessarily causes a reduction of stock, much of which has to be disposed of at a sacrifice that causes the farmers to feel somewhat blue, especially as the grain crops are light; potatoes ditto. Corn was good where cultivated, but as this is not a staple crop in this region, it does not supply the deficiency in other products. Root crops (with the exception of potatoes) and garden vegetables uncommonly good.

WALDO AND PENOBSCOT SOCIETY.

By E. H. Nealley, Secretary.

The Ninth Annual Cattle Show, Exhibition and Fair of the Waldo and Penobscot Agricultural Society, was held, as usual, on the grounds of the Society, formerly the Monroe Trotting Park, October 2d and 3d, 1877.

This is the ninth year since the incorporation of the Society, and each year it has met with success in every department. About two years ago, the Society purchased of the Monroe Trotting Park Company, their grounds, and at that time they had but very little money in the treasury to work with, but by judicious management of their officers all outstanding debts have been paid, and there is a fund in the treasury which the company intend to expend upon their grounds the coming season, in erecting buildings, &c., which, when completed, will make it one of the very finest show grounds in this part of the State. The first day of the fair the weather was fine, and the attendance good; the greater portion of whom brought some article to enter, to make up the show.

The entries made in the stock department were large, and of a superior quality. The show of fat cattle was good. In draft oxen there was a larger show than any previous year. Much interest was manifested at the drawing. In the class of four years old oxen, working oxen, three and two years old steers, steer calves and trained steers, the show was good. The entries in town teams, farm stock, stock and milch cows, bulls and bull calves, was never better. The horse department was better filled than at any of our previous fairs. The display of sheep, swine and fowls was not quite as good as in former years, but of superior quality, and in fact the out-door exercises of the fair were better than ever before.

The show in the halls was much too large for the building. This is a very interesting part of the exhibition, and all the Society lacks is room to display the many articles in the ladies' department, and in fruit, field crops, grain, &c. There were many more entries made in this department this year than ever before.

The second day was devoted to the showing of matched horses, family, carriage, work and draft, and the trial of speed of horses in the different classes. The Society is offering larger purses on stock than in former years, which I think is of great value to its success. It encourages farmers to raise a better grade of stock, and to keep them in better condition.

The wheat crop in this section was quite good the past season, much more being sown than in the past few years. I think that each farmer in the State of Maine should try and raise wheat enough to supply his own family with bread.

EAST PISCATAQUIS SOCIETY.

BY E. E. STURTEVANT, SECRETARY.

The Fifth Annual Exhibition of this Society was held in Milo, September 26th and 27th. The weather was unexceptionably good, and the attendance much larger than at any former exhibition. There were 207 entries in the several departments; more, I believe, than at any former exhibition. The show of thoroughbreds was small, but grades—Durham, Hereford, Dutch and Jerseys—were well represented, as was the native stock. The show of matched oxen and steers was good; in draft oxen rather below the average. The show of sheep was hardly up to last year, the quality being inferior. In swine the display was good; in poultry, fair. The display of stallions was good, some fine stock animals being exhibited; the same may be said of brood mares and colts. The exhibition of draft, carriage and speed horses, was better than last year. The dairy was well represented. The display of fruit was small, not up to last year. Grain and root crops were represented in large variety, and in better condition than last year. Domestic manufactures were not so numerous as last year, but were of better quality. There was, as usual, a large variety of embroidery, worsted work, flowers, &c. The baby show was an interesting feature, and drew a large crowd. On the whole, I may say that the exhibition for 1877 was a success.

This Society, as may be seen, is young, and labors under the disadvantage of not having a park, or any suitable fair grounds; yet, the proceeds of the fair, together with the amount drawn from the State, have thus far been sufficient to pay all expenses and premiums. The Society is free from debt, with a good list of members, and is at present in a prosperous condition.

In reviewing the proceeds of the farm, as compared with last year, I report as follows: hay crop light, owing to the severe drouth in June, in many cases only two-thirds of a crop. Many tons of late cut hay spoiled in the field, by the continual wet weather which succeeded the dry; though I think the amount harvested is sufficient for our needs, as it spends better than last year. Grain, also, averages light; those who sowed early get a good yield, while those who sowed late get a light crop. Our farmers are giving more attention to wheat than formerly, many raising all the flour they consume. Corn was in large yield, and ripened well—rather above the average. Barley is raised but little; Indian wheat more extensively; rye, but little. Potatoes are of good yield and of excellent quality, except those planted late, which were injured by rust. The potato bug put in an appearance quite extensively, but did not seem to injure the crop. In fruit, apples were much below the average; other kinds good. I think, however, that not enough attention is paid to fruit culture, few raising more than enough for home consumption. Hundreds of dollars are yearly expended for Western apples, which do not possess the rich flavor, so desirable in an apple, that is obtained in our Maine fruit. Many have tried to improve their orchards by introducing New York trees, but each trial is a failure! Every farmer should set out a few trees, procured North, every year, and in a short time he would have an orchard to be proud of, and at small expense.

Although the season as a whole may be called "hard for the farmer," I am convinced that no class of people is better prepared for a cold winter. An error that exists among the farmers here—and it may apply to other societies—is, that of not keeping an account with the farm. I believe that no farmer can be eminently successful, in all the word implies, without keeping an account with his farm, any more than the merchant or lumberman can in his business; yet, we find very few farmers who can tell us what it costs to put in their crops, or what they are worth after they are harvested; neither can they tell what per cent., if any, this or that crop pays. The lumberman would be considered unwise to cut cedar, when pine pays better; so is the farmer, to raise oats if wheat or corn pay better. Would it not be a better way, instead of raising about so much of each kind, to ascertain which pays best, and give more attention to that? Another thing we lack here, is the improvement of stock. Too many good farmers, so called, are content to keep five or six cows that barely make the butter and cheese for the family, when, by taking a little pains to improve the stock, two would do as much as the six. The same neglect is observed in the raising of sheep.

I believe the annual fair is doing a good work, inasmuch as it brings farmers together for an interchange of ideas, and also tends to awaken the spirit of competition, which is much needed in this section, as too many are careless in this respect, and do not take the interest in agriculture that they ought. I believe the Society and club should be liberally supported.

WEST SOMERSET SOCIETY.

By Benjamin G. Albee, Secretary.

The Annual Show and Fair of the West Somerset Agricultural Society, was holden on the Society's grounds at North Anson, October 2d, 3d and 4th. The weather threatened rain, doubtless keeping many people and cattle away from the show and fair.

There were entered for exhibition and premium 101 head of cattle, 238 sheep, 54 horses and colts, and 17 swine. The exhibition of poultry was small. The exhibition of cattle was excellent. The young stock was in good condition, and made a good show. The oxen looked finely. The exhibition of sheep was probably as good as any in the country. The display of horses and colts on the second day was good. Twelve family horses were entered, and made a fine display on the track. As it looked like rain all day, but few met in the afternoon to see the $25 purse trotted off.

The third day the fair was in Carrabasset Hall. The weather being cloudy and rainy, the attendance was small, so that, financially, the exhibition was nearly a failure. The farmers of West Somerset still believe they can make a living by farming, and mean to try. Our Society is out of debt, and, financially, in good standing.

OXFORD COUNTY.

By A. C. Thomas King, Secretary.

The Society held its Thirty-Fifth Exhibition, October 2d, 3d and 4th, with a very satisfactory display in the halls, and an extensive show of stock. There were sixty entries of horses and colts; of bulls, twelve; steers, thirty-three; heifers, twenty-five; herds, four; stock cows, four; milch cows, four; oxen, nineteen; making over one hundred entries of neat stock. There were three entries of town teams of oxen; four of town steer teams; three of plowing; six of drawing; three of disciplined oxen; fourteen of sheep; three of swine (being thoroughbred Berkshire and Chester); twelve of poultry; fifty-four of garden vegetables; thirty-seven of seeds of farm crops; five of farm crops; eight of agricultural implements; five of carriages; nineteen of children's carriages and sleds; one piano; five organs; of boots, shoes, leather and harnesses, there were but four entries; twenty-six of dairy products; bread, fourteen; canned goods, honey, sugar, and syrup, sixty-two; fruit, fifty-six; flowers, five; domestic manufactures and needle work, two hundred and eighteen; miscellaneous, fifty-one—making nearly eight hundred entries.

The first day being very pleasant, there was more than the usual attendance, and an unusual amount of entries. The second day, also, was pleasant, and the attendance was larger than ever before, there being about five thousand persons on the ground. The first exercise was plowing, at 9 o'clock, which was not remarkably interesting, and seems to depreciate rather than increase in interest. At 10.30 o'clock the examination of town teams of oxen was of itself a good show, the teams of oxen consisting of not less than fifteen pairs; three years old steers, ten pairs; two years old steers, eight pairs. The owners chose committees to reduce the teams, to the best pairs of the required number. At 1 o'clock P. M., was trotting for all horses not having a record less than three minutes. There were twelve entries in this race. At 2 o'clock the drawing match, to test the strength and to award the premiums for disciplined oxen.

The third day was cloudy, and gave indication of necessary adjournment; but, finally, past the middle of the forenoon, the trustees deemed it best to carry out the programme as far as possible, and close the fair. The exhibition was financially successful.

SAGADAHOC SOCIETY.

By I. E. Mallett, Secretary.

The Twenty-Third Annual Fair of this Society was held from October 9th to 18th. The weather was very unfavorable. The hall was opened the 9th, but the show upon the grounds did not commence till the 10th, and the weather not appearing favorable in the early morning, there was not so great a display of cattle as there would have been if the weather had been fair. However, there was a very creditable show of oxen, cows, bulls, young stock, sheep and swine, upon the grounds, the poultry being arrayed in the lower hall. Of town teams of oxen there were but three exhibited; teams of steers, five entries, comprising some eighty-five pairs. There were four entries of farm stock, and the awarding committee stated that it was as good a display of farm stock as they ever saw on exhibition at any show whatever. The exhibition of sheep was fully up to any previous show, among which were the Cotswolds, Southdowns and their grades, there being in all about twenty entries. Of swine, there were thirteen entries, comprising Berkshire, Poland

China, White Chester, representing in each variety the thoroughbreds and their grades, and we thought the animals were fully up to those on exhibition at the New England Fair. The display of horses and colts was, as usual, very good. The Knox stock has been the leading stock, and probably is now, but the Patchen stock was quite fully represented this year by young horses and colts.

In the hall was the finest display of farm products that I ever saw anywhere—which I am aware appears like "brag;" but we have some champion corn, wheat and garden produce raisers within our limits. There were lots of corn that it would be hard to beat. First premium on crop of corn, was awarded to William Alexander of Harpswell; yield, 245 bushels of ears on 1⅞ acres of green sward, dressed with nine cords of barn manure and sea-dressing, composted, to the acre. First premium on wheat to the same; yield, 55 bushels on 1¾ acres, "Lost Nation" variety. Second premium to B. L. Pennell of Brunswick; yield, 26½ bushels on one acre; amount of seed sown, one bushel. Best crop of barley, Eddie W. Mallett of Topsham; yield, 35½ bushels on 170 square rods. Best crop of oats, C. T. Patten, Topsham; yield, 45 bushels, by measure, weighing 46 lbs. to the bushel, on green sward, manured with 10 cords barn manure to the acre. The display of samples of crops were very numerous, and I feel safe in saying was never equalled by this Society. The exhibition of garden produce was also abundant and excellent, Lewis Simpson of Brunswick, bearing off the prize for best collection this year, as he has done every year since our Society was organized.

The display of agricultural implements was rather small. The Frye steel plow was on exhibition, also the Haymaker mowing machine, and we think them to be among the best of their class. The display of poultry was, as last year, arranged in the lower hall, and it was a fine display, a credit to the exhibitors. I think every kind of hens, and nearly every kind of turkeys and ducks were represented. It was a creditable display of poultry, and had many admirers.

In the upper hall there was a very fine collection and variety of fruits. Pears and grapes were well represented, as were jellies, preserves, &c. In the dairy department there was a great competition, and the committee found it a difficult task to even satisfy themselves, much more, the different competitors. The display of home made household goods was not, perhaps, quite up to some former years in quantity, but in quality, we think, never was excelled.

FRANKLIN CENTRAL SOCIETY.

By A. J. Porter, Secretary.

The Third Annual Exhibition of this Society was held at its grounds, Strong, October 3d and 4th. The weather on the mornings of both days of the exhibition was cloudy, with indication of rain, preventing many from contributing. This, together with the short hay crop, deprived us of the usual display of fine, large oxen and thrifty steers, which usually form so attractive a feature in the exhibitions of this Society. As a whole the exhibitions were very good, and the third show and fair of the Franklin Central was a decided success. Farming, in this section, the past year, has been attended with very good results, and wherever the farmer has applied his time and talent to his profession, with good management, his labors have been rewarded with bountiful crops.

The hay crop, owing to the drouth, was below an average, but the deficiency was made up in a measure by being secured in season and in excellent condition. Potatoes a fair crop and excellent quality, while grain of all kinds never looked better. All kinds of stock were well represented by animals of more or less note; while horses and sheep husbandry receive the usual interest. The introduction of thoroughbred stock is increasing, and promises to be a very attractive feature in the future.

The exhibition in the hall was a very full and fine collection, consisting of the products of the dairy, the garden, the orchard and the vineyard, together with the handiwork of the ladies of the society.

The address was delivered by L. L. Snow, Esq., of St. Albans, and was an able and timely production, listened to by a large and attentive audience. Subject: "Farm Management."

NORTH KNOX SOCIETY.

By W. Gleason, Secretary.

The Ninth Annual Fair of this Society was held at Warren, October 9th, 10th, 11th and 12th, with unfavorable weather. In the department of orchards, appletrees and nurseries, there were but three entries. The fruit exhibited was good, but the crop was very small. Not much interest was manifested in the department of beef. In the department of steers, matched oxen and steers, bulls, cows and heifers, there was a good exhibit, embracing Jersey, Ayrshire, Durham and Hereford stock. Of sheep, swine and poultry, there were thirty-seven entries; dairy, twenty-six entries; and the chairman of the committee said it was the best exhibition he had ever seen. Of field crops there were thirty-seven entries; roots and vegetables, forty-four entries, some very fine samples; flowers, twenty-eight entries. A very fine display of cut, pot and artificial flowers were on exhibition. Carriages were numerous. Cabinet work, organs, mowing machines, agricultural implements, all the production of manufactories within the limits of the Society, were exhibited, and were seldom equalled, never excelled. Of household manufactures there were seventy-four entries. This department was well represented. Of horses and colts there were thirty entries, mostly Knox and McLellan breed. The stock was considered by the committee, very satisfactory.

CUMBERLAND COUNTY.

BY SAMUEL DINGLEY, SECRETARY.

I hardly know what to say at this time, as the reports of secretaries of agricultural societies are about the same from year to year. The past season has been one of more than ordinary benefit to the cultivator of the soil. Crops have been very much above an average, compared with past years, especially in this part of the State; and it is in the power of the farmer, at this time, to say to what extent agriculture shall be pursued, and what position the tiller of the soil shall take in the social world. The most encouraging feature that I see in this direction is, that young men are taking hold with an apparent determination, to say the least, to succeed as agriculturists. Let us see to it that they have all necessary encouragement in so laudable an ambition.

EAST SOMERSET SOCIETY.

BY J. FINSON, SECRETARY.

The Annual Cattle Show and Fair of the East Somerset Society was held September 11th and 12th. The weather on each of those days was fine, and the attendance very large. The amount of stock on exhibition was an average, compared with former years. There were one hundred and thirty entries of stock for premiums. The hay crop was far below an average, but of good quality, and harvested in excellent condition. The grain crop was light; the earlier sown wheat, however, yielding more abundantly than that sown late. The corn crop was very good. The potato crop was light, and the quality poor.

A farmers' club has been organized recently, in connection with the Society, and meetings are held weekly a part of the time, and a part of the time semi-monthly. There are, already, about twenty-five members, and much interest is taken in the questions set apart for discussion at each meeting.

EAST OXFORD SOCIETY.

By B. W. Stockwell, Secretary.

The Seventeenth Annual Exhibition of this Society was held on the Fair Grounds at Dixfield, September 27th and 28th. The weather was very favorable. The first day was devoted to the exhibition of neat stock, the trial of draft oxen and town teams. The display of cattle on exhibition was very good, but not as good as last year, for the reason that many of the members had disposed of their surplus stock. Of town teams only two were displayed. Some fine pairs of matched oxen and steers were presented. A few lots of sheep were exhibited, some of which were excellent. The desire to raise large sized early lambs is increasing in this part of the county; consequently, the farmers sell off their smallest lambs, and save their largest to increase the size of their sheep. Sheep raising is receiving closer care and attention from the members of this society than in former years.

At the hall the display of fruit, farm and garden products, was large, and of excellent quality. The ladies' department was well filled and tastefully displayed. The second day was devoted to the exhibition of horses and colts, of which there were a large number, embracing stallions, breeding mares, family and matched horses; also, a large collection of trotting horses. The largest share of these were of the Knox family. There were exhibited some very valuable and promising colts of both Morrill and Knox blood. The trotting was fast, and drew a large number of people to witness it. During the day there was a baby show at the hall, in which twenty-five babies were exhibited, drawing a crowded house, and adding very materially to the receipts of the fair. The address was delivered by Samuel B. Brackett, Esq., of Dixfield. It was an able and interesting production, and was listened to by a large concourse of people, and duly appreciated.

NORTH FRANKLIN SOCIETY.

By P. A. Sawyer, Secretary.

The North Franklin Agricultural Society has been unfortunate during the past two years in the selection of days on which to hold the annual show and fair, the present season, especially, seeming to be particularly disastrous. The days first selected proving very cold and rainy, the trustees adjourned for one week, and happened to strike the very worst day that could be imagined for the show—cold and rainy. Nevertheless, as it was very late in the season, it was thought best to make no further postponement, and the forms of a show were gone through with; but not one-sixth of the stock previously entered on the Society's books was brought upon the ground.

The day appointed for the fair was beautiful, and people thronged in from all directions. It was estimated to be more fully attended than any similar occasion ever before held in the place. The display in all departments was the best by far ever witnessed here. The fruit stands were particularly well laden, and occasioned great surprise to those who had wept over the supposed loss of all the orchards and fruit trees by the ravages of the caterpillars. It evidenced the fact that our farmers are taking unusual pains to grow young orchards, and are succeeding in their efforts. One man who made the best exhibition of fruit, said he gathered twenty-one bushels of graft apples from one tree, the present fall. The garden vegetables were particularly noticeable, on account of their abundance, variety and quality. Cabbages, beets, squashes, onions, pumpkins, and all other things grown in the garden, were seen on all sides. The centre of the hall was taken up by specimens of ladies' handiwork, and this department was unusually well represented; and one pleasing feature was the amount of useful articles exhibited.

Farming is rapidly improving in this section. Many of the people who have been in other places seeking employment, are returning to their farms, and seem determined to make them pay. More clearing and plowing has been done during the past two years, probably, than for the five years preceding; and great preparations are being made this fall for sowing and cropping another year.

ANDROSCOGGIN COUNTY.

By W. R. Wright, Secretary.

The Twenty-Sixth Annual Cattle Show and Fair was held in Lewiston, October 2d, 3d and 4th, 1877. The neat stock exhibition was larger and much better than usual. Quite a large number of herds were shown, embracing from ten to twenty-two milch cows, besides other stock. Town teams of oxen and steers, working oxen, matched cattle, draft oxen and steers, cows and heifers, bulls and calves, thoroughbred and grades, gave credit to the Androscoggin "cattle show." Of sheep, there were few presented, but they were good specimens, consisting of Cotswolds and Cotswold grades. Of swine, Berkshire and Chester and grades, male and female, with progeny.

On the second day, there was a grand display of horseflesh. There were exhibited quite a large number of stallions of various ages; breeding mares, with foals; family and work, matched carriage and team horses, and numerous colts of various ages.

In the halls, there was a fine display of vegetables, grain, butter, cheese, fruit, &c. The various branches of industry in the household, manufactories and shops, were represented, making, as a whole, a splendid show, embracing almost one thousand entries, besides some fifty coops and cages of poultry, birds, &c. Of butter and cheese, there were fifty-four entries, and of fruit, beyond the expectation of the most sanguine. Of flowers and plants there was a tempting display, and musical instruments, sewing machines and other labor-saving inventions too numerous to mention.

The society is free from debt, and is prospering finely. Col. R. I. Burbank of Shelburne, N. H., delivered a very valuable address before the Society on Thursday, the last day of the fair, showing that success in farming requires thorough cultivation, high feeding of the soil; saving all the manures, and using instead of selling; keeping improved breeds of stock, &c.; and by so doing mortgages would be among the things that were, and farms would flourish as the green bay tree.

WEST OXFORD SOCIETY.

By D. Lowell Lamson, Secretary.

The Annual Exhibition of the West Oxford Agricultural Society was held at the Fair Grounds in Fryeburg, October 9th, 10th and 11th, 1877. The weather proved rainy the first and third days, and the exhibition was practically condensed into one day, therefore was not so successful as could be desired. The annual address was omitted. Quite a number of nice cattle were on the grounds, notwithstanding the rain. The best exhibit in this department was from the town of Denmark. Fryeburg seemed to take more pride in horses, by their superior numbers in this department. There were, however, many splendid specimens of swine from Fryeburg, and also from Brownfield. This class was unusually well represented. The poultry exhibit was also very full and pleasing. Never were there so many coops of different varieties brought for exhibition.

In the hall there was a large amount of butter and cheese, and all of superior quality. The departments of household manufactures and needle-work were rather sparingly filled. Fruit was very choice, but not in such variety and abundance as sometimes before. Vegetables in large variety and great perfection.

The season in most respects has been favorable for general farm productions, within the limits of this society. Rains have been copious and following, reaching September without any drouth. The hay crop, however, was rather below the average, and some was secured in poor condition, on account of the frequent rains, while meadow lands were generally abandoned. Corn yielded well and ripened early. We never had such an exhibit of corn as at this show. Potatoes a fair yield; but some intervale lands were flowed by an August freshet, which destroyed the entire crop in such localities. Tubers, generally, early manifested signs of decay, which was not so well developed as the season advanced. The Colorado beetle appeared pretty generally, but, as we are aware, no fields were ruined by them. The market price has hardly ruled as high as last season, notwithstanding all these drawbacks. Fruit very scarce. Two or three nurseries were planted out, and entered into successful competition for the Society's premium, offered under direction of the Board of Agriculture. Mr. Joseph W. Colby of Denmark, takes the first premium in this direction; Mr. John L. Kimball of Hiram, the second.

The Society offered this year $590.50 in cash premiums; the total amount awarded, including amount for fruit culture, $409.09. Incidental expenses for the current year, $235.88; making a total disbursement of $644.97. Receipts from all sources (State stipend not included), $637.56—a falling off from last year of more than one hundred dollars.

SHAPLEIGH AND ACTON.

By Horace Bodwell, Secretary.

The Twelfth Annual Fair and Exhibition of our Society was held on the Shapleigh and Acton Fair Grounds, October 10th, 11th, 12th and 13th, 1877, which proved a success, as usual. The exhibition of neat stock was fully up to any former year, both in numbers and quality; the sheep, swine and live fowl exceeding former years. The field and garden crops were of the choicest kinds, both in quantity and quality. Some good specimens of fruit were on exhibition. The ladies' department was crowded to its full extent, making the show in the hall one of our best for the past twelve years. The first day was taken up by the entries and the examination of the cattle, sheep, swine and fowl. The second day commenced with a large entry of horses and colts, and the track was alive with horse teams and their drivers; but the rain soon closed that part of the horse display, and at 12 M., although a large crowd was on the ground, the officers thought it best to adjourn to the next day. The third day closed up the examination of horses and colts at 12 M., and the afternoon was devoted to the drawing and plowing matches. The excitement exceeded anything of the kind ever seen on our grounds. Ten pairs of cattle were entered for drawing on the drag, and nine pairs were hitched to the drag loaded with stone, yoke by yoke, as their turns came, showing some of the best drawing and discipline ever shown on our grounds, and the crowd left at the close well pleased with the exhibition of the day. The fourth and last day—known as the "horse day"—being one of the fine October days, brought in a large crowd from the surrounding towns.

The hay crop was below an average. Grass came forth early in the spring, but very thin both in the fields and pastures, undoubtedly the effects of last year's drouth. Of wheat, rye, barley, oats and corn, there was a good yield, both in quality and quantity. Of potatoes, a fair yield; but many fields were more or less damaged by the rusts, on or about the middle of August. Potato beetles made their appearance early in the season, but the farmers were on the look-out for them and destroyed them as fast as they made their appearance on the vines. The fruit crop was light, yet a fair supply for our own consumption, with a very small surplus.

WEST WASHINGTON SOCIETY.

By James L. Bucknam, Secretary.

The Eighteenth Annual Exhibition of this Society was held in Jonesborough, September 25th and 26th. The weather was favorable, and the attendance on both days was fully up to the average. There were not as many cattle at the show this year as at some of the preceding fairs, but more full blooded stock than usual. There were some very fine Short-horns exhibited by Mr. Moore and son, of Machiasport, and some fine Jersey stock, also, by F. H. Peterson of Columbia Falls; and others drove in fine stock. More sheep were on exhibition than at any previous show for a number of years. Mr. Floyd of Centreville, and Mr. Varney of Jonesborough, had some fine samples at the fair. There were not so many horses as at some other shows held by this society, but those on exhibition were mostly fine animals. Fowl were exhibited in greater numbers than at any show held by this society. A variety of breeds of pure blood were exhibited by Mr. Stone of Machias.

The quantity of farm produce was greater by far than ever before at any fair held by this society, which may be considered ample testimony of the beneficent effects this society is having upon the farming interests of this part of the county. And here I may add, that the extent of land tilled this year, within the limits of this society, was very much larger than ever before since the organization of it.

Potatoes were principally grown, and they are selling now at a price that will handsomely remunerate for their cultivation, and leave a margin for profit. Grain was cultivated to a considerable extent, especially wheat, of which there was more sown than for many years. The yield was very good, in some instances twenty bushels from one bushel's sowing. Some fine samples were on exhibition at the fair; also, of barley and oats, which were produced in considerable quantities. There were some very fine samples of apples, pears and grapes, shown by William Freeman, Jr., of Cherryfield; and others had very nice fruit at the exhibition. Root crops of all kinds did well, and a heavy yield was harvested. The efforts of the farmer through the past season have been crowned with success, and his labors amply rewarded.

KNOX COUNTY.

By F. W. Smith, Secretary.

The Exhibition of the Knox Agricultural Society was held in Camden, September 25th, 26th and 27th, 1877, and proved to be one of the best and most satisfactory of any ever held in this county. The weather during the three days was delightful. The fair had never before been held in this village, in consequence of there being no suitable building for that purpose. The new hall, recently completed, offered sufficient inducement to the officers of the Society to go there with the exhibition. The people of Camden, proud of their new hall, determined to fill it and make a fine display; this they accomplished in a very commendable manner. All were active and interested to make the show a complete success. Early Monday morning produce of every variety came pouring in, together with representations of the leading industries of this fine manufacturing village, and a great variety of curiosities and articles in the ladies' department, so that by Tuesday noon, when the hall was opened for public admission, it was literally filled, above and below. The farm products were sufficient to fill tables, the united length of which were two hundred feet. This produce was in the lower hall, on the ground floor, together with a large assortment of agricultural implements, exhibited by Fred Atwood, Esq., of Winterport, which display covered about eight hundred square feet of space. In the upper hall, fifty feet square, there were four long tables, each forty feet in length, covered with a great variety of exhibits, including curiosities, antiquities, needle-work and fine arts, and the display of various wares; the walls were decorated with pictures and original paintings; the front of the gallery was covered with beautiful quilts, rugs, &c., and many more were suspended on ropes stretched across from gallery to gallery. In the rear of the stage, on a terraced platform, were a hundred or more of pots and vases of blooming flowers, tastefully arranged. Of two ante-rooms on the upper floor, one contained a large and varied collection of grapes, and the other jellies, honey, pickles, preserves and bread.

The stock was exhibited on the second day. This part of the exhibition was not so large as on some former occasions, owing probably to the fact of the fair being located at one end of the society limits. Camden exhibited a fine town team of horses and oxen, and a goodly number of full blooded cows and heifers. The display of swine and poultry was larger than usual. There was a larger proportion of full blood and graded stock than commonly seen at our fairs. Thursday forenoon an interesting drawing match called together many people; several pairs of horses, oxen and single horses gave exhibitions of their strength. In the afternoon an immense crowd came to see the baby show. The score of little innocents behaved in a becoming manner, four of whom were awarded prizes; two for beauty and two for size.

There is much improvement to be seen in the agricultural affairs of the county. Bountiful crops of all kinds have been harvested the past season. An unusually large area of potatoes were planted; no injury done by the Colorado beetle, but on low lands they were considerably affected by the potato rot. We are pleased to state that our society is out of debt, and has a respectable nest egg in the treasury.

PISCATAQUIS CENTRAL SOCIETY.

By D. W. Brockway, Secretary.

The Piscataquis Central Agricultural Society held its Twenty-Fourth Annual Fair at the Society's grounds, on Wednesday and Thursday, October 3d and 4th. The first day was chilly and cloudy, but large crowds began to assemble early in the day, and by 2 P. M. the grounds were covered with a large concourse of people. There were 392 entries for premiums.

The display of stock exceeded in excellence and variety any former exhibition of the Society. Very fine herds of grade Durhams and thoroughbred Jerseys were exhibited. There were many pairs of large, well matched oxen, large and handsome steers, and fat calves. There were several cows with brilliant records as dairy animals. The show of horses was very fine, the Knox stock taking the preference. The display of sheep was quite large and of the best quality. A fine show was also made of hogs and pigs, mostly of the Chester breed.

The hall show was the best ever had. At an early hour Wednesday, a great variety of farm products, butter, cheese, fruit, flowers, etc., were in their places, and made a fine display. The handiwork of the ladies was, as usual, abundant, and of fine quality. Field crops were hardly up to last year, owing to excessive rain in August. Hay was fair in quantity and of good quality; potatoes fair in quality and not an average yield; wheat, not an average yield. Early sown wheat yielded abundantly, while late sown rusted badly and yielded about half a crop. The root crop was good. Corn yielded abundantly, and the quality was excellent. There is no crop raised in this county that ensures a more certain and profitable yield than corn. Dr. J. B. Cochrane, of Dover, raised eighty-two bushels of shelled corn on one acre of ground.

The matter of producing artificial dressing needs more thought among our farmers. Mr. James Hewitt, of Dover, says: "I made dressing enough last winter, with the help of two hogs and two pigs, with muck, to manure two acres of corn that yielded fifty-two bushels of shelled corn per acre, with no other dressing, except one hundred pounds of Bradley's superphosphate."

The fruit crop in this section was very light, except in some orchards that have had good care, where the crop was very satisfactory.

PENOBSCOT CENTRAL SOCIETY.

By M. S. Palmer, Secretary.

The Eleventh Annual Exhibition of this Society was held at East Corinth, September 12th and 13th, 1877. The weather being pleasant, the members of the Society were enabled to be present, with their usual large show of stock and farm products. Fine stallions, excellent carriage horses, admirable draft horses, and prolific mares with fine colts, were exhibited. Messrs. Gould, Morrison, Smith, Foss and Comins, exhibited bulls, which were worthy of premiums. Messrs. Richardson, Sanborn, Foss, Holt, Gray, Trickey, Morrison, Gregory, and others, had oxen and steers of various grades, which drew premiums. The sheep and swine departments were well represented. Garden produce, and an excellent variety of orchard fruits were temptingly displayed. Messrs. Lord of Charleston, and Duren of Corinth, are giving commendable attention to native nursery stock. Mr. Gregory of Charleston, presented good specimens of white China wheat, raised from thirty-two kernels received from Minnesota four years ago, which by yearly sowing has produced the present season twelve bushels from one bushel of seed. This is a tall, bearded wheat, with large straw, and ready for the reaper in three months from time of sowing; makes a fine, white flour. There were good specimens of jellies, syrups, and domestic wines; nice samples of fine needle-work, flowers and wax work.

At the meeting of the Board of Agriculture held at Calais, a resolution was passed, urging the importance to our agricultural literature of the publication of surveys of the different counties in the State, giving brief notes of their history, industrial resources and agricultural capabilities; and directing the Secretary to procure such contributions for the annual reports. In conformity with this resolution, and also as carrying out the settled policy of the Board in this respect—evidences of which are found in the publication of similar reports in previous volumes—I give herewith a Survey of the County of Hancock, written by a gentleman who has been a member of the Board of Agriculture, uninterruptedly, from its first organization, and who is in every way well fitted for the work, which he has so well performed. It was originally published in the *Ellsworth American*, during the summer of 1876, but has been especially revised for the present report. In many respects the history of Hancock County is a most interesting one; some of its industries are important, and quite distinct from those of other counties, and its agriculture, though not so important as that of some other sections in the State, is such as to present many interesting features and practices. The survey is full and satisfactory, and will be welcomed by the people of the State in the complete and permanent form in which it is now given to them.

SURVEY OF HANCOCK COUNTY.

By Samuel Wasson, East Surry, Member of Board of Agriculture.

Introduction.

1. Those who are familiar with ancient mythology, will recollect the story of the good Isis who went forth wandering to gather up the parts and fragments of her murdered and scattered Osiris, fondly, yet vainly hoping that she might recover and recombine all the separate parts, and once more view her husband. With equal assiduity, has the writer of this serial, been for years engaged, at intervals, in collecting the "scattered fragments" of Hancock County, and has arranged his imperfect materials in the form which they now exhibit.

2. *Position.*—This, one of the seaboard counties of eastern Maine, occupies a geographical position, mainly between the parallels of 43° 58′ and 45° 20′ north latitude, and between 67° 47′ and 68° 30′ west longitude. Its northern parallel crosses the State, very nearly within its geographical centre.

Its boundaries are Washington county upon the east, the Atlantic upon the south, Penobscot bay, river and county upon the west and north. It is of very irregular shape. From north to south it measures about eighty-five miles, and in width varies from six to forty miles.

3. *Divisions.*—It has one city, thirty-one incorporated towns, and twenty-nine inland and island townships. There are hundreds of islands within its civic limits, the largest of which is the most conspicuous of any upon the whole Atlantic coast.

4. *Incorporated.*—This, the fourth county, was organized in 1789, with Penobscot for its shire town. It included portions of Penobscot and Waldo counties, and extended northward to the Canada line. No county in Maine has undergone more changes in territorial limits. In 1791, a part was set off and re-annexed to Lincoln. In 1816, a portion was taken to form Penobscot county. In 1827, a part was taken off for Waldo. In 1831, a change was made in the partition line between Hancock and Washington. In 1844, another change, and in 1858 Greenfield was set off and annexed to Penobscot. The west and north lines are still as awkward as possible, while none but a skilled scientist can project the zigzag moulding of its coast-line.

5. *History.*—The early history of Hancock county, as now formed, is a part of the earliest history of the State, and forms an unbroken historical chain, extending back hundreds of years before "Columbus crossed the ocean blue." Presumptive,—if not conclusive—evidence is to be found at Mt. Desert, that the Northmen who peopled Greenland, also visited this part of our coast, caught fish in its waters, and cured them upon its shores. Although the coast was frequently seen, and landings made by European voyagers for some six hundred years, nothing came of it until the explorations of Pring in 1603, and Weymouth and De Monts in 1605. (There is a tradition that Rosier the historian of Weymouth's expedition, explored Deer Island Thoroughfare, making a halt at a bold promontory in Brooksville, known as Cape Rosier.) They found the country inhabited by a nation of "canoe-men," now known as the Tarratine or Penobscot Indians. De Monts, who seemed to know of the "nine points" in possession, claimed the "newly" discovered country, in the name of the king of France, in true Catholic style, by setting up a cross and calling the country "Acadia," by which name it was known for 150 years, or until Gen. Wolfe, in 1759, waved his banner in triumph over the Plains of Abraham. The year following De Monts claim, Weymouth took formal possession of the same country, in the name of

his king, James I. of England. Thus the two leading Powers of Europe became adverse claimants to our soil. France, by virtue of explorations of Cartier in 1534, and possession of De Monts in 1602. England, by virtue of discovery of Cabot, in 1498, and claims of Weymouth in 1603. The wars which these counter claims occasioned, kept this county an almost unbroken wilderness during the provincial history of Maine.

In point of fact, the county of Hancock was a part of the French Province of Acadia, for a period of 180 years; and France did not fully relinquish her claim until after the War of the Revolution. The first official effort of the Government of France to "enter possession," was a patent of Acadia, granted to De Monts, which, two years after was surrendered to a Catholic French lady (Madame De Guercheville), who was desirous of making the experiment of converting the natives to the Catholic faith. She immediately sent over her agent (Suassaye), with twenty-five colonists, to take possession of Acadia. Suassaye and colony landed May 16th, 1613, at Mt. Desert, built a fort, erected a cross, celebrated mass, and called the place "St. Sauveur," which is supposed to be the locality now known as Ship Harbor, Tremont. About the "pool" at Somes' Sound, is supposed to be where the French missionaries, Biard and Masse, located themselves in 1609. Frenchman's Bay is supposed to have acquired its name from a peculiar incident which occurred to a French ecclesiastic who encamped somewhere between the Union and Narraguagus rivers, during the winter of 1603. At Trenton Point is supposed to be where Madam Deville lived.

The first English possession was a trading post at Pentegoet (Castine), in 1625–6, which soon fell into the hands of the French, and the flag of France floated over it during nearly the whole of the 17th century.

The appearances of the old French settlements have been found at Castine, Newbury Neck, Surry, Oak Point, Trenton, East Lamoine, Crabtree's Neck, Hancock, Butler Point, Franklin, Waukeag Neck, Sullivan and upon the "Desert

Isle." Not until after the fall of Quebec, in 1759, were any permanent English settlements made.

6. *Land Grants.*—The first grants of land, were six townships each six miles square, between the Penobscot and Union, then known as the Donaqua River, which were granted to David Marsh *et als*, by the General Court of Massachusetts, upon certain conditions, one of which was that they should settle each township with sixty Protestant families, within six years. These grants were No. 1, (Bucksport); No. 2, (Orland); No. 3, (Penobscot); No. 4, (Sedgwick); No. 5, (Bluehill); and No. 6, (Surry). Six other townships east of the Donaqua River, were granted upon the same terms. But three of these are in this county, which are No. 1, (Trenton), granted to Eben Thorndike *et als*; No. 2, (Sullivan), to David Bean *et als*, and No. 3, (Mt. Desert) to Gov. Bernard. The whole survey was made by Samuel Livermore, and as six of the townships were on one side of the river, and six on the other side, the circumstance gave the present name of "Union River."

The onerous conditions imposed on the grantees, in this "forest wild," could not be fulfilled, which occasioned a deal of uneasiness, as a new claimant might oust the occupant. In 1785, Massachusetts "quieted" the actual settlers in each, a hundred-acre lot. The grant of these several townships was made in 1762. One of the conditions in each grant was, that the grantee "yield one-fifth part of all the gold and silver ore and precious stones found therein."

These grantees individually bound themselves in a penal bond of £50, conditioned to lay out no one of the townships more than six miles in extent, on the banks of the Penobscot, or on the sea coast; to build sixty dwelling-houses, at least 18 feet square; to fit for tillage 300 acres of land, erect a meeting-house, and settle a minister. There were reserved in each township one lot for parsonage purposes, another for the first settled minister, a third for Harvard College, and a fourth for the use of schools, making 1,200 acres in each township, reserved for public uses.

7. *Gregoire's Claim.*—About the year 1688, the King of France gave to one Cadilliac, a grant embracing the whole of Mt. Desert, which Cadilliac held till 1713, styling himself "Lord of Donaqua and Mt. Desert." After the War of the Revolution, one Gregoire claimed the whole island in right of his wife, Maria T., a grand-daughter of Cadilliac. Gov. Bernard, to whom the island had been granted, had lost his title by confiscation; but to his son John, one-half of it had been restored; and in consideration of a request made in favor of Gregoire's claim, by Gen. Lafayette, Massachusetts recognized it as valid, *which is the only French claim ever sustained to lands in Maine.*

To indemnify this heir of Cadilliac for lands included in her claim, and which the Government had disposed of, there were quitclaimed to her 60,000 acres.

This tract included the present towns of Trenton and Lamoine, with a part of Sullivan, Ellsworth, Hancock, Eden and Mt. Desert, with the islands in front of them. Many of the present settlers hold their lands under old French titles. Many of the original titles to lands are acquired from Province grants and form Indian deeds.

Gregoire with his family settled in Mt. Desert; there lived and died, and himself and wife were buried outside of the burial-ground at Hull's Cove, Eden. Tradition says they were so buried because they were Catholics. Some of the Gregoire deeds are in the possession of the writer.

8. *Land Lottery.*—In 1786, Massachusetts attempted a lottery sale of fifty townships, between the Penobscot and Passamaquoddy. The land intended to be sold, was represented by 2,720 tickets, the price of each ticket $2.00. These "lottery townships," and those who settled upon them, were to be exempt from taxes for 15 years. Every ticket was a prize ticket; the smallest prize being a half-mile square, and the largest a six mile square. There were five managers, one of the number being Leonard Jarvis, of Surry. On the drawing of the lottery, it was found that but 437 tickets were

sold, and only 165,280 acres drawn, and 942,112 acres remained unsold. The average price received for the lands drawn was about 52 cents per acre. The lots not drawn, and also the greater part of the prize lots, were purchased by William Bingham, of Philadelphia, a man of immense wealth. Mr. Bingham died in England in 1803, and left one son and two daughters. One of the daughters married Alexander Baring, of London. At one time the Bingham heirs owned in Maine, outside of the lottery purchase, 2,350,000 acres.

The lottery townships in Hancock, sold to Bingham, were Nos. 14, 15 and 16, each containing 23,040 acres. The conveyance was made January 28th, 1793, by Samuel Phillips, Leonard Jarvis and John Reed, a Committee appointed by the General Court of Massachusetts. The "consideration," named in the deed, is "a large and valuable sum of money." Query—Were not the "up-river" townships north of the tier of townships, sold to Bingham, included in the lottery scheme? In 1796, Bingham purchased the residue of the Gregoire grant. A plan of the 60,000 acre grant to Madame De Gregoire, was made by Nathan Jones and Samuel Thompson, and a survey of the same, by John Peters, was completed on or before January 8th, 1789.

August 4, 1792, Barthelemy De Gregoire, after "excepting out" certain "lots" and "tracts," sold the balance of his grant, or 23,121 acres, to Henry Jackson, of Boston, for £1,247, 16 shillings. Jackson, July 9th, 1796, sold his claim to Bingham for $100.

The outlines of the Gregoire grant are thus defined in the earliest recorded deeds: "A tract of land lying on the main, on each side of the Donaquec river, in the County of Hancock. Beginning near the Sweedeland Mill dam, on the Eastern side of Skillings river, thence due North 550 rods to Taunton bay, there crossing a cove in said bay 432 rods in the same course, and running same course from said bay 460 rods, for the N.E. corner, thence 7 miles and 56 rods to Union river, a due West course, crossing the river and continuing 2 miles, 172 rods, thence South 68 East to Union river, crossing the same, and continuing 176 rods to a stake in Melatiah Jordan's field."

In the conveyance from Gregoire to Jackson, or in that from Jackson to Bingham, among the lots "excepted out," are 100 acres to Mr. Jennison, 100 to James Hopkins, one-half of Trenton, and part of No. 8, conveyed to Jean Baptiste De La Roche; Gregoire's farm; a lot at North East Creek, Mt. Desert, lying between lots of Nicholas Thomas and Eliza Higgins; 450 acres intended for the town of Mt. Desert; a lot of Col. Jones, a settler on Great Duck Island, and 8,333 acres of No. 7, granted to the Beverly Cotton Manufactory.

The islands "lying in front," granted to Barthelemy De Gregoire, and his wife Maria Theresa De la Motta Cadilace De Gregoire, and which were a part of the Bingham purchase, are Bartlett's island, containing 1,414 acres; Great Cranberry island, 490 acres; Little Cranberry, 73 acres; Sutton's, 74 acres; Bear, 9 acres; Thomas, 64 acres; Green, 44 acres; Great Duck, 182 acres; Little Duck, 59 acres; also, two small islands of 6 acres each. Col. John Black, an Englishman by birth, who resided at Ellsworth for many years, was the Bingham heirs' agent. Messrs. Hale and Emery now hold that trust. The Bingham lands presented an inviting field for "smugglers," and the value of timber pilfered therefrom is immense.

Sketches of Town History.

9. In the year 1787, Penobscot, the first town in the county, and the 49th in the State, was incorporated. The Act of Incorporation was entitled "An Act for Incorporating a certain plantation in the county of Lincoln, called Majorbigwaduce, or Number Three, into a town by the name of Penobscot;" the Bill of Enactment was signed "Artemas Ward, Speaker."

The several town histories must be condensed within a few lines. We shall attempt to narrate only a few prominent events. In this matter of town history, I would that each town in our county emulate the example of Castine, and that too ere

> "The times that are gone by
> Are a sealed book."

10. *Penobscot.*—Incorporated (49th town) February 23, 1787. Population, 1,418. Decennary loss, 138. Wealth, per capita, $148. State valuation, $227,356; United States valuation, $318,298. Its appellation of Penobscot, is from the Indian "Penobskeag," or "Penopeauke," signifying "rocky place." It was a part of the district of ancient "Pentagoet." In the Act of Incorporation it is called "Majorbigwaduce." It was Township "Number Three," in the grant to David Marsh *et als*. It is situated at the head of Northern Bay, one of the "great-coves" of the Bagaduce river (Baggadoose), or written in Indian (Masi-anbaga-8-atoes-ch). The river is an arm of the Penobscot, the "great river of Nerumbega." At first, Penobscot included all of Castine, and the westerly part of Brooksville. The first survey of the town was made by John Peters. The following names appear among its earliest municipal officers: John Lee, Jeremiah and Daniel Wardwell, John and Joseph Perkins, John Wasson, David Hawes, Elijah Littlefield, Isaac Parker, and Peltiah Leach.

The subjoined historic data are from the pen of H. B. Wardwell: "The first settlers within the present limits of Penobscot, were Duncan and Findley Malcom, Daniel and Neil Brown. They were Scotchmen, and being loyalists or tories, left for St. Andrews when the English evacuated Majebigyuduc, in 1761. Findley Malcom and Daniel Brown married daughters of my great-grandfather, Daniel Wardwell. The first permanent settler was Charles Hutchings, in 1765. The first child of English parents was Mary Hutchings. In 1765 came Isaac, Jacob Sparks and Daniel Perkins, Samuel Averill and Solomon Littlefield.

The first settler in Penobscot, as originally incorporated, was Reuben Gray, in 1760. To him a daughter (Mary) was born, Nov. 4, 1763, and a son (Samuel) May 8, 1767. In 1765, Gray sold out to Aaron Banks, and took up the farm now occupied by Levi Gray, in Sedgwick."

Union soldiers, 158; State aid, $3,172; town bounty, $23,782; cost per recruit, $170.

11. *Sedgwick.*—Incorporated (2-59, that is, the 2d in the county and the 59th in the State), January 12, 1789. Population, 1,113. Decennary loss, 150. Wealth, per capita, $180. State valuation, $197,706. United States valuation, $285,696. Named in honor of Maj. Robert Sedgwick. Plantation name "Naskeag." By the earlier adventurers it was called "Nasket." In a "census of the people in this region," in 1688, two French families, of eight souls, were found at Naskeag Point. The first permanent settler was Andrew Black, in 1759. Four years after, came Goodwin Reed, John and Daniel Black, and two years later Reuben Gray "moved in" from Penobscot. The first white child, Elizabeth (who lived to a great age), was born in 1759. First minister, Daniel Merrill. The descendants of Reuben Gray are exceedingly numerous. They preserve their *prolificness*, and other family traits, unimpaired down to the latest generation. In 1817, 5,000 acres were cut off and annexed to Brooksville. In 1849, about 8,800 acres were taken off to form the town of Brooklin. Benjamin, its only river, is little else than a *spur* of Eggmoggin Reach: Its first post office was established in 1812. Now, it boasts of a telegraph station. Union soldiers, 120; State aid, $1,464; town bounty, $8,712; cost per recruit, $85.

Prof. Burns, Superintendent of the Burns mine, Amesbury, has taken charge of the Eggmoggin mine, Sedgwick, Me. It has a capital of $200,000, and reduction works have recently been erected at a cost of $40,000. There are 500 tons of ore at the Philadelphia mint which will average $100 a ton.

12. *Bluehill.*—Incorporated (3-62 town) Jan. 30, 1789. Population, 1707. Decennary loss, 196. Wealth, per capita, $225. State valuation, $397,620. U. S. valuation, $572,572. First settled near "Fire Falls," April 7, 1762, by Joseph Wood and John Roundy. Next settlers, Nicholas Holt, Ezekiel Osgood and Nehemiah Hinckley. First child, Jonathan Darling, born in 1765; second child, Edith Wood, in 1766. The township first known as No. 5. The plantation name was "Newport." The town takes its name from a

majestic hill, which rises to an altitude of 950 feet above high-water mark. Congregational Church formed in 1772; Baptist, in 1806. First post office in 1795. Jonathan Fisher, settled minister from 1796 to 1837. Eccentric "Parson" Fisher, 'tho' dead, his good name liveth. Academy incorporated in 1803, and endowed by a grant or half of No. 23, Washington county. This grant was sold in 1806, for $6,252. Of this sum, $1,188 have been lost. Has a social library of some 500 volumes. In 1769, the settlers voted to raise money "for to hire a person for to preach the gospel to us, and for to pay his board."

Union soldiers in the war of the Rebellion, 196; State aid, $3,038; town bounty, $17,995; cost per recruit, $102.

13. *Deer Isle.*—Incorporated (4-63 town) January 30, 1789. Population, 3,404. Decennary loss, 178. Wealth, per capita, $120. State valuation, $417,211. U. S. valuation, $680,783. First visited by European voyagers, in 1605. The abundance of deer in its forests, gave it its name. First settlement commenced near what is now known as the "Scott Farm," by William Eaton, in 1762. First church in 1773. First preacher, Rev. Mr. Noble. First pastor, Rev. Peter Powers. Rev. Joseph Brown, a dissenter, installed in 1809. Population in 1790, 682. First white child, Timothy Billings, born May, 1764. The privations of the settlers during the War of the Revolution, were terrible.

Union soldiers, 314; State aid, $6,294; town bounty, $59,128; cost per recruit, $208.

14. *Trenton.*—Incorporated (5-65 town) Feb. 16, 1789. Population, 678. Wealth, per capita, $175. Derived its name from Trenton, N. J. First settlements by English settlers, about 1763. Anterior to this, French settlements were commenced at Trenton and Oak Points. This town was first granted by Plymouth Colony, in 1752, to Eben Thorndike *et als.* Massachusetts confirmed it to Paul Thorndike in 1785. Thompson's and Alley's islands are within its limit. In 1870 it was divided into two towns, and the eastern half incorporated as Lamoine.

State valuation, $260,729. U. S. valuation, $375,449. Union soldiers, 149; State aid, $2,361; town bounty, $29,600; cost per recruit, $207.

15. *Gouldsborough.*—Incorporated (6-66 town) February 16, 1789. Population, 1709. Decennary loss, 8. State valuation, $224,690. U. S. valuation, $323,560. Received its corporate name in honor of Robert Gould, one of the original proprietors—*Borough*, from the Anglo Saxon *burgh*, a town; in England, a town that sends members to Parliament. There were squatters here as early as 1700. The first settlers were from Saco and vicinity, and were Libby, Fernald, Ash and Willy. The first male child was Robert Ash, and the first female, Mary Libby. The first post office in 1792. An old inhabitant says: "Nathan Jones and Thomas Hill settled here in 1764." Maj. Gen. David Cobb of Revolutionary fame, one of Washington's Aids, and afterwards Judge of the Common Pleas Court of Hancock County, resided here many years. This town embraces Stave, Jordan's, Ironbound, Porcupines, Horns, Turtle, and Schoodic Islands. That part of No. 7, known as "West Bay Stream," was annexed February 26, 1870. It is the most easterly town in the county, and has the most extensive sea-coast. On Ash's Point are the relics of an old French fortification. At Grindstone Point is an immense deposit of metaphoric or silicious slate, excellent material for grindstones. Its hidden mineral wealth must be developed by some geological scientist, not afraid of "*surf-running*."

Union soldiers, 167; State aid, $2,584; town bounty, $27,460; cost per recruit, $179.

16. *Sullivan.*—Incorporated (7-67 town) February 16, 1789. Area, 17,500 acres. Population, 796. Wealth, per capita, $195. Named in honor of Capt. Daniel Sullivan. Indian name, "Waukeag" (a seal), and also called, previous to incorporation, "New Bristol." First settlement commenced in 1762, by Sullivan, Simpson, Bean, Gordon, Blaisdell and Card. Embraces eight islands, viz: Capital A, Bean's, Dram, Preble's, Bragdon, Burnt, Black, and Seward.

In the Revolution, forty families here were reduced to twenty. This township was granted to David Bean; the king refused to confirm it, and the settlers were quieted in 1803, by Massachusetts, in 100 acres, on payment of $5.00 each. At Waukeag are evidences of an old French settlement. At the commencement of the Revolutionary War, nearly two-thirds of the settlers moved back to York. Nine thousand acres in this town were donated to Bowdoin College. In 1841, an earthern pot, containing somewhat more than $400, was dug up. They were French coins, bearing date of 1725. In 1875, human bones were dug up, supposed to be French or Indian.

Union soldiers, 80; State aid, $2,210; town bounty, $14,459; cost per recruit, $208. Decennary loss, 76; State valuation, $146,954; U. S. valuation, $204,414.

17. *Mt. Desert.*—Incorporated (8-68 town) February 17, 1789. Population, 918. Decennary gain, 1. Wealth, per capita, $175. State valuation, $158,069. U. S. valuation, $228,619. Its corporate name is supposed to be from "De Monts Desert Isle." It has gained currency that the island was known to the Northmen as early as 1008. First occupancy by French in 1604. Peter Biard and Enemond Masse were here in 1609. Madame De Guerchville's colony came in 1613. In 1688, an English settler named Hinds, wife and four children, lived here. The first permanent settlement was by Abraham Somes and James Richardson, in 1761. The first child, George Richardson, was born in August, 1793. The first marriage, August 9, 1774. Became a plantation in 1776. This sea-cradled island is distinguished as the place where the first Jesuit Mission in America was established. Its topography is a natural curiosity. Contrary to the ordinary level formation of islands, it is thrown up into huge granite mountains to the number of thirteen. The altitude of Green Mountain is 1,762 feet; of Sargent's Mt., 1,098 feet; Brown's, 880 feet; Mt. Robinson, 680 feet; Dog, 680 feet; and Carter's 660 feet. In 1838, Bartlett's, Hardwood and Robinson's islands, were set off and incorpo-

rated into "Seaville." Christopher Bartlett first settled on Bartlett's Island about 1770. The Act incorporating Seaville, was repealed February 24, 1859. Bartlett's Island was annexed to Mt. Desert. The town has been twice divided, Eden taking off 22,000 acres, and Tremont half of what remained.

Union soldiers, 161; State aid, $1,455; town bounty, $14,722; cost of recruit, $160.

18. *Bucksport.*—Incorporated (9-79 town) June 27, 1792. Population, 3,433. Decennary loss; 121. Wealth, per capita, $360. State valuation, $1,219,881. U. S. valuation, $1,756,628. This was township No. 1, in the grant to Marsh. It was incorporated as Buckstown, and was not changed to Bucksport till 1817. The township was surveyed by William Chamberlain, in 1762. Col. Jonathan Buck, from Haverhill, Mass., commenced the first settlement in 1764. For him the town was named. The next year Laughlin McDonald and his son Roderick, took up lots. In 1766-7, Asahel Harriman, Jonathan Frye, Benjamin Page, Phineas Ames, and Ebenezer Buck came. The first preacher was Rev. John Kenney, in 1795. First settled minister, Rev. Mighill Blood, in 1803. In 17— the British burnt a part of the town. The post office established in 1799. About 1804 the *Gazette of Maine* was printed. In 1806, "Penobscot Bank" was established, and continued six years. The ill-treatment which the inhabitants received from the British in 1776-7-8, drove many families away, and they employed Indian guides to pilot them through the woods to Kennebec. Some of them returned in 1784.

Union soldiers, 419; State aid, $7,345; town bounty, $56,618; cost per recruit, $150.

19. *Castine.*—Incorporated (10-105 town) February 10, 1796. Population, 1,303. Decennary gain, 53. Wealth, per capita, $335. State valuation, $461,343. U. S. valuation, $664,333. The History of this "old town," has been prepared and published by G. A. Wheeler, M. D. It is an interesting and trustworthy compilation. The town appro-

priated $350 therefor. Castine perpetuates the name of Baron de St. Castin, a French nobleman, who established a residence here in 1667. It has a traditionary history running back to 1555. Under the name of "Pentagoet," it became known to the English settlers of New England, about 1626. It has never been without a garrison from 1630 to 1783. It has been successively possessed by the Indians, French, Dutch and English. Five naval engagements have taken place on the bosom of its harbor. One of those engagements, called the "Penobscot expedition," is said to be the most disastrous issue our arms have ever experienced. The first permanent English settlements made within the present limits of Castine, were in 1760, by Aaron Banks, William Stover, and Reuben Gray. "Old Kit," who died in Brooksville, at the advanced age of 104 years, was born upon the Dea. Hatch farm. The first child, William Stover, was born upon the farm where E. H. Buker lives, in November, 1764. In 1797, one Mariam Freethy, a shiftless person, was warned to leave the place—they had "tramps" in those days. The first corporate town meeting was held at the house of Jacob Orcut, at Orcut's Harbor. During the decennial period, ending 1850, its per capita wealth, with one exception (New Haven), exceeded that of any other town in the United States. For many years it was the Fishing Emporium of Maine. The repeal of the Fishing Bounty Act, and losses by rebel cruisers, have almost completed its commercial ruin. Its loss of taxable estates, from 1860 to 1870, was nearly 40 per cent. It was the shire town from 1796 to 1838.

Union soldiers, 157; State aid, $7,627; town bounty, $15,834; cost per recruit, $149.

20. *Eden.*—Incorporated (11-107 town) February 23, 1796. Population, 1,195. Decennary loss, 52. Wealth, per capita, $175. State valuation, $196,499. U. S. valuation, $282,955, Regarding its appellation (Eden), the presumption is in favor of its being so named for Richard Eden, an early English author. There is a tradition that its natural beauties suggested its name. It is "impossible to disen-

tangle" the ancient history of that portion of the "Coaste Hills," now comprised in the present town. Its early history and that of Mt. Desert, are inseparable. At Hull's Cove, Gregoire and his wife lived, died, and were buried. They died in 1610, and were buried outside of the grave-yard, without priest, book, or cross. Tradition runneth, that being Catholics, Protestant prejudice would not allow them a final resting place inside. The first English settlement was in 1763, by two families named Thomas and Higgins. We excerpt the following from the first marriage record: "This is to certify that, inasmuch as there is no Lawful Authority within 30 miles of this place, whereby we can be married as the Law directs, We do promise in the presence of God and the angels * * * * to cleave to each other so long as God shall continue both our lives." It proved a happy and fruitful union.

Union soldiers, 103; State aid, $2,356; town bounty, $17,351; cost per recruit, $191.

21. *Orland.*—Incorporated (12-124 town) February 12, 1800. Population, 1,701. Decennary loss, 86. Wealth, per capita, $280. State valuation, $374,390. U. S. valuation, $539.121. Anciently called "Alamasook," next "Eastern River." It was No. 2 in the grant to David Marsh. Its name is supposed to be derived from "Oar-land"—an oar having been found upon its shores by the first settler, who was Joseph Gross, in 1764. Ebenezer Gross came in 1765, and Joseph Viles in 1766. Viles built the first framed house. Zachariah Gross, the first child, was born 1766. The first road was laid out in 1771. The first mills were built by Calvin Turner, in 1773. In 1790 it had 290 souls. In 1775, the men of this plantation and those of No. 1, formed themselves into a military company, and also chose a Committee of Safety.

Union soldiers, 195; State aid, $5,786; town bounty, $14,855; cost per recruit, $164.

22. *Ellsworth.*—Once called "New Bowdoin," comprising No. 7, a part of No. 6, and the northwest part of Trenton,

was incorporated February 26, 1800. Population, 5,257. Decennary gain, 599. Wealth, per capita, $235. State valuation, $1,233,199. U. S. valuation, $1,775,813. Benjamin Milliken is said to be the first settler, and that he settled here in 1763. Says the "oldest inhabitant," "the first meal cooked in Ellsworth by a white woman, was by a daughter of Milliken's, the cooking being done by the side of a huge boulder, which stood where Dutton's store now is." The next settlements were by Meltiah Jordan, Benjamin Joy, Colonel Jones, George Lord, Nathaniel and John Jellison. Others soon came and made their "clearings." In twenty years it had a population of 992. First minister, Rev. J. Urquhart, in 1785. Rev. Peter Nourse, ordained in 1812. Became the shire town in 1838, and a city in 1869. All of the buildings now standing south of Main street, have been built within sixty years. The first framed house is in the rear of Clark & Davis' store. According to "ye olden custom," which was, that at a "raising" some citizen bold, bestride the ridge-pole, name the building, and break a bottle of rum, which in this instance was as follows:

"This is a good frame,
It deserves a good name,
What shall we call it?
'Josh Moore's folly,
And Pond's delight,
The lawyer has got it,
It looks like a fright."

The first children born were Edward and Susan Beal. Ellsworth has more than eight times the territorial area of Castine. It has a gross water power of 6,600 horse, or 240,000 spindles, the equivalent in working energy of 2,240 population. It was named in memory of Oliver Ellsworth, one of the delegates to the National Constitutional Convention.

Union soldiers, 653; State aid, $22,946; town bounty, $49,600; cost per recruit, $111.

33. *Surry.*—Incorporated (14-147 town) June 21, 1803. Population, 1,242. Decennary loss, 77. Wealth, per capita,

$172. State valuation, $209,137. U. S. valuation, $271,157. Named by the Jarvis proprietors, for Surrey, England. This was Township No. 6, in the grant to Marsh. First occupied by French at Newbury Neck. The first English settlers were Symonds, Weymouth, and James Flye. Symonds "squat" upon the farm now owned by Samuel Wasson, and Weymouth upon the Point which bears his name, a part of the old Joy farm, now in possession of G. W. Hutchings. The next settlers were John Patten, Hopkinson, and Andrew Flood, Wilbraham Swett, Matthey Ray, Samuel Joy, Isaac Lord, Hezekiah Coggins, and Leonard Jarvis. Mr. Jarvis was a Representative in Congress from 1831 to 1837. While in Congress, he proposed to vindicate his honor, by fighting a duel with F. O. J. Smith.

Up to the year 1820, about 13,000 acres had been alienated, and were held under grants to settlers and "quiet possession" titles. The quantity of land remaining, was purchased by the Jarvis'. In 1840, "the Jarvis farm" was the best cultivated and the most productive farm in the county. Dry rot is its only product now. In 1800, Surry included that portion of Ellsworth known as ward 5. In 1829, it was re-annexed to Ellsworth. In this matter, the agent for Surry has been charged with consummate perfidy. In 1790, it had a population of 239. In 1874, a small quantity of silver coin was found at Weymouth Point.

Union soldiers, 135; State aid, $2,912; town bounty, $22,948; cost per recruit, $191.

24. *Brooksville.*—Incorporated (5-222 town) June 13, 1817. Population, 1,275. Decennary loss, 152. Wealth, per capita, $190. State valuation, $198,998. U. S. valuation, $286,557. Named in honor of Governor Brooks. It took from Sedgwick an eighth, and from Castine and Penobscot each a fifth of their taxable property. It was a part of ancient Pentagoet. Its early history is almost entirely embodied in that of Castine and Penobscot. The first exploration was by James Rozier in 1605. First settled in 1777, by John Wasson, Samuel Wasson and David Hawes, Revolution-

ary soldiers. They found three squatters here, a Mr. Roax, Eben Leland and Arch Haney. About 1780, William Roax and Elisha Blake settled upon the "Cape." The first white child born within the present town limits was Mary Grindle, May, 1765. She was born upon the farm now owned by G. M. Farnham. Upon Henry's Point, and near Oliver Bakeman's, the British erected 6-gun batteries, in 1779. The "tooth of time" has nearly obliterated both. The first corporate town meeting was held in John Bray's house.

Union soldiers, 130; State aid, $3,621; town bounty, $22,086; cost per recruit, $195.

25. *Franklin.*—Incorporated (16 town) January 24, 1825. Population, 1,042. Decennary gain, 38. Wealth, per capita, $165. State valuation, $123,056. U. S. valuation, $177,310. Originally, Plantation No. 9. Named in honor of Dr. Franklin. First occupied by the French, at Butler's Point. Moses Butler and Mr. Wentworth came here in 1764, and are supposed to be the first English settlers. The next settlers were Joseph Bragdon, Mr. Hardison, Mr. Hooper and Abram Donnell. This is one of the eight towns in the county which shows a gain of population during the last decennial period. On Butler's Point are apple trees upwards of 100 years old.

Union soldiers, 120; State aid, $5,804; town bounty, $12,280; cost per recruit, $150.

26. *Hancock.*—Incorporated (17 town) February 21, 1828. Population, 974. Decennary gain, 49. Wealth, per capita, $170. State valuation, $163,904. U. S. valuation, $236,621. Formed from parts of Sullivan, Trenton, and No. 8. The pioneer settlers were Oliver Wooster, Agreen Crabtree, Thomas McFarland, Thomas Roger, and Joseph Googins. They came in 1764–5. Philip Hodgkins, Reuben Abbot, Thomas Moon and Richard Clark, came in 1766-7-8. There are two mill-streams, which glory in the names of "Egypt," and "Kilkenny."

Union soldiers, 115; State aid, $3,054; town bounty, $16,900; cost per recruit, $173.

27. *Cranberry Isles.*—Incorporated (18 town) March 16, 1830. Population, 350. Decennary gain 4. Wealth, per capita, $255. State valuation, $61,515. U. S. valuation, $87,980. Named for its extensive cranberry marsh, 200 acres in extent. Its early history must be chiefly sought in connection with that of the parent town, Mt. Desert. The first English settler within the present limits of the town, was John Roberson, who, about 1761, settled upon the island which bears his name. The first settlers upon Cranberry Isle were supposed to be a Mr. Bunker and William Foss. The first selectmen were Samuel Hadlock, Enoch Spurling and Joseph Moore.

Union soldiers, 27; State aid, $162; town bounty, $6,095; cost per recruit, $232.

28. *Aurora.*—Incorporated February 1, 1831. Area 23,040 acres. Population, 212. Wealth, per capita, $155. Derived its name from Aurora, goddess of morning. Its first settlers were four brothers, Samuel, Benjamin, David and Roswell Silsby, who came here in 1805. For some years they had, as there were no roads, to carry their grain on their backs, seven or eight miles to have it ground. This was one of the "lottery" townships, and was incorporated as Plantation No. 27, in 1822. The "Whale's Back," one of those formations known as "horsebacks," is in this town. The "air-line road" passes over it for a distance of three and one-half miles. Decennary loss, 65. State valuation, $32,052. U. S. valuation, $56,154.

Union soldiers, 27; State aid, $20; town bounty, $1,983; cost per recruit, $117.

29. *Amherst.*—It was set off from the plantation of Mariaville, in 1822, and incorporated on the 5th of February, 1831. Its name was suggested from Amherst, N. H. It is thought that men began to come in and fell trees in it as early as 1802 or 1803. Among the first that came, were Mr. Chapman, Mr. Shumway, Mr. Whitman, John Barker, John Giles, Thomas Harpworth and Mr. Graves. In 1805 Capt. Goodell Silsby came in from Charleston, N. H. In 1806 or 1807 his parents came and took up the lots now known as "The Old Silsby Place."

The first and only meeting-house was erected in 1844. Three men, one living in Amherst and two in Aurora, built it. The first settlers endured many hardships. Some came into Ellsworth, in a vessel, and from that point found their way hither by following a spotted line on the trees. Some carried their grain twelve miles on their backs to grist mill, and then home again.

This is the 26th town. Population,. 350. Decennary loss, 34. Wealth, per capita, $165. Area 23,040 acres. State valuation, $57,276. U. S. valuation, $82,477.

Union soldiers, 43 ; State aid, $522 ; town bounty, $5,300 ; cost per man, $142.

30. *Waltham.*—Incorporated (21 town) January 29, 1833. Population, 366. Wealth, per capita, $160. Derives its name from Waltham, Mass. This town was carved out of Mariaville. Its first settlers were Samuel Ingalls, Eben Jordan, Lebbeus and Eben Kingman, who settled here in 1805. Webb's brook, the outlet of Webb's, Scammon's, Abram's and Molasses ponds, affords a very valuable water power, which, if properly utilized, would build up a thriving village. Decennary loss, 8. State valuation, $44,092. U. S. valuation, $63,492.

Union soldiers, 37 ; State aid, $1,094 ; town bounty, $6,194 ; cost per recruit, $194.

31. *Otis.*—First occupancy, 1805. Incorporated (22 town) March 19, 1835. Named in honor of —— Otis, a proprietor; name, prior to incorporation, New Trenton. Population, 245. Wealth, per capita, $110. First settlers, Isaac Frazier, N. M. Jellison, James Gilpatrick and Allan Milliken. Decennary gain, 36. State valuation, $26,407. U. S. valuation, $38,636.

Union soldiers, 35 ; State aid, $470 ; town bounty, $4,975 ; cost per recruit, $155.

32. *Mariaville.*—First occupancy, 1802. Incorporated (23 town) February 29, 1836. Named in honor of Maria, a daughter of Bingham. Name prior to incorporation, Tilden. Population, 369. Wealth, per capita, $180. First settlers, Mr. Fabrick, Seth Alcott, B. and D. Eppes, James Hapworth

and Elisha Goodwin. For years, all "up river" was known as Mariaville. It has been reduced to its present unshapely limits by taking off Aurora, Amherst and Waltham. Decennary loss, 89. State valuation, $65,742. U. S. valuation, $84,668.

Union soldiers, 43; State aid, $914; town bounty, $6,710; cost per recruit, $177.

33. *Dedham.*—Incorporated (24 town) February 1, 1837. Population, 458. Decennary loss, 161. Wealth, per capita, $230. State valuation, $94,338. U. S. valuation, $135,898. Was a part of No. 8. Named for Dedham, Mass. First settled in 1810, by Nathan Phillips. The "colony" settlement, for years, was known as "New Boston." The "colonists" were accused of "putting on airs." It is a "hard road to travel." Its highways are very expensive, as the Bangor and Ellsworth mail stages pass over several miles of its road, 1,304 times a year.

Union soldiers, 56; State aid, $1,046; town bounty, $3,000; cost per recruit, $72.

34. *Eastbrook.*—Incorporated (25 town) February 8, 1837. Population, 187. Decennary loss, 34. Wealth, per capita, $225. State valuation, $30,288. U. S. valuation, $46,574. Area, 23,040 acres. This was Plantation No. 15. Derived its name from its *east-brook* branches of Union river. The first settlements were made in 1800, by Joseph Parsons, Robert Dyer, Samuel Bragdon, and John E. Smith. Joseph Parsons built the first mill, and first framed house. The first child was Frances Usher Parsons. This is one of the three square towns.

Union soldiers, 23. State aid, $501. Town bounty, $4,077. Cost per man, $194.

35. *Tremont.*—Detached from Mt. Desert and incorporated (26 town) June 3, 1848, under the name of Mansel, but in August of the same year its name was changed to Tremont. Population, 1,822. Wealth, per capita, $145. Derives its name from the Latin of three mountains, viz.:

Western, Defile, and Dog mountains. Tinker's, Moose, Hardwood, Gott's and Langley's islands are within its limits. The original titles are chiefly ancient French grants. Gott's Island, named for Daniel Gott, has ten families, and forms a school district. State valuation, $262,353. U. S. valuation, $377,784. Decennary gain, 54.

Union soldiers, 160. State aid, $2,152. Town bounty, $30,053. Cost per recruit, $20.

36. *Brooklin.*—Detached from Sedgwick and incorporated (27 town) June 9, 1849, under the name of Fort Watson. One month after, its name was changed to Brooklin. Population, 966. Wealth, per capita, $200. A Mr. Black was the first permanent settler. His daughter, Elizabeth, the first child, lived to the age of 102 years. In 1688, there were two families at Naskeag, Chas. St. Robins, and La Flour. Naskeag Point is frequently mentioned in ancient documentary history. Decennary loss, 77. State valuation, $186,899. U. S. valuation, $269,124.

Union soldiers, 97. State aid $1,287. Town bounty, $15,520. Cost per recruit, $119.

37. *Verona.*—Incorporated (28 town) February 11, 1861. Area, 5,600 acres. Population, 352. Wealth, per capita, $160. First mentioned as the Island of Lett. Prior to incorporation was known as Orphan Island and Wetmore Isle. It was formerly a part of Prospect, and for many years a part of Bucksport. It originally belonged to the "Waldo Patent." Fell into the possession of an orphan girl, hence the name of Orphan island. It was finally purchased by Wetmore. In 1763, there were three families on this island, and not a settler above there on the river. Verona was named for a town in Italy, on the Po river. State valuation, $51,075. U. S. valuation, $72,348.

Union soldiers, 19. State aid, $1,621. Town bounty, $7,309. Cost per recruit, $438.

38. *Lamoine.*—Set off from Trenton and incorporated (29 town) February 11, 1870. Area about 11,000 acres. Population, 612. Wealth, per capita, $2.32. Named for

Lamoine, an early French resident, who at one time owned a large tract of land west of Skillings river. A colony of French made a transient settlement on Trenton Point, at an early day. Two of the colonists, Delaittre and Desisles, became permanent residents. Hon. W. King says, "the first settlement at Lamoine, formerly Trenton, was made in September, 1774, at Gillpartric's Point by Gillpartric," which is corroborated by Capt. Berry, who adds, "Capt. Isaac Gillpartric, with six sons and two daughters, from Biddeford, and a son-in-law, Edward Berry, from Londonderry, N. H., were the first settlers." Both these gentlemen say, "the French came subsequent to Gillpatric." If so, from whence came the "brass kettle," not an article of Indian make or use? State valuation, $142,443. U. S. valuation, $204,616.

39. *Isle au Haut.*—This our "youngest," was incorporated February 28, 1874. It includes Isle au Haut (Isle of Holt), the two Spoon islands, Yorks, Fog, Burnt, Merchant's, Kimball's and all the other islands south of Merchant's Row. The Isle au Haut is one league directly south of Deer Isle. It contains about 3,000 acres. The highest part of the territory is in the middle of the island, and exhibits the appearance of a saddle. When first explored, it was called "High Island," its shore being bold, with high, steep cliffs.

My informant, G. L. Hosmer, says: "The first settlement was made on Merchant's Island, in 1772, by Anthony Merchant. Kimball's Island was settled during the Revolution, by Seth Webb, a noted hunter, and for whom Webb's pond, in Eastbrook, was named. Great Isle au Haut was settled in 1792, by Peltiah Bartor.

40. *Islandport*, February 11, 1857, "Lunt's" Long Island was incorporated as the town of "Islandport." The Act was repealed March 27, 1858, and it went back to a plantation. The support of its paupers inures to Tremont. The first settlers were, one Barker, William Rich, William Pomroy, Amos, Jacob and Ezra B. Lunt. The settlers hold their titles by occupany. It has a population of 177. It is a spot of some 500 acres, well out "amid old ocean's roar."

41. *Plantations.*—This word was applied by England to British colonies in America, but never to any of the dominions in Europe. Since 1861, unorganized townships, when they contain not less than 150 inhabitants, have been required to organize as Plantations.

42. *Inland Plantations.*—No. 7, population, 69. No. 8, population 20. No. 10, population 10. No. 21, population 56. No. 28, population 12. No. 32, population 17. No. 33, population 102.

43. *Island Plantations.*—Hog Island, population 6. Long Island, population, 177. Harbor Island, population 13. Bear Island, population 13. Bradbury Island, population 6. Eagle Island, population 30. Spruce Head Island, population 22. Beach Island, population 9. Butter Island, population 9. Eaton Island, population 1. Marshall's Island, population 12. Pickering's Island, population 5. Pumpkin Island, population 4. Hackatosh Island, population 4. Mt. Desert Rock, population 6. Swan Island, population 451. Estates, $27,805.

44. *Mt. Desert Rock.*—This island rock, with less than a half acre surface, is isolated in stormy ocean, twenty miles from the main. Upon it is a Primary Sea Coast Light, built in 1830. The tower of the light is sixty feet high, and the light is seventy feet above sea level. At sea, under ordinary states of atmosphere, it can be seen at a distance of twelve nautical, or nearly fourteen statute miles. The first light houses within the county limits were Baker's Island and Dill's Head, and were built in 1828.

PHYSICAL OUTLINES AND FEATURES.

45. *Mountains.*—The county has but one mountain chain, and but one mountain group. The line of mountains stretching across the Island of Mt. Desert, is a continuation of the Schoodic system. Mt. Desert Rock and the Porcupines, are ocean-mountains of the same system. This range in crossing the Island of Mt. Desert, is upheaved into thirteen well-

defined mountain peaks. The highest peak of the "Coaste Hills," is Green Mountain, in Eden.

The only mountain group is in Dedham; here ten mountains are clustered together. Those ten mountain peaks, "rocks piled on rocks immensely high, with yawning gulfs between," has given to the town the name of "The Switzerland of Maine." The other elevations deserving the geographical name of mountains, are Bluehill mountain, in Bluehill; Bull Hill mountain, in Eastbrook; Bald and Tunk mountains, in No. 10, and Lead mountain, in No. 28. The mountains upon the main, are conical peaks, standing in isolation.

There are nine "Bald" mountains in the State. Lead mountain is said to have been so named, from the fact of lead having been found at its base. Query? May this not be the "lead mine" discovered 50 years ago, by the hunter, Webb?

46. *Surface.*—The characteristic feature of the topography of the county, is its unevenness, being moderately hilly, with a greater fresh water area than any other county in the State. As the mountains stand in a low rank on the scale of elevation, (in the ninth) so the valleys are not ravine in character; the grand feature of its surface conformation, being long swells, or ridge-ranges, variously broken and diversified with local elevations and depressions, with but few abrupt acclivities or escarps. The only narrow defiles of the "gorge" form, are at Morgan's bay, Surry, McHeards, Bluehill, and near Mason's Mills, Orland. There is a deal of waste land, known as "Heaths." May not these be ponds overgrown and heath-clad with shrubs?

47. *Water-Sheds.*—The county has three drainage-streams; the Penobscot river on the west, Union river in the centre, and Narraguagus river on the east. These divide the county into three drainage districts, with two water-sheds. The termini of the western water-shed are Byard's Point and Hat Case Pond. The towns lying within the western slope, and which are drained into the Penobscot basin, are Deer Isle, Sedgwick, Brooksville, Penobscot, Castine, Orland, Verona, Bucksport, and a part of Dedham.

The termini of the eastern water-shed are Schoodic Point and Nickatou Lake. The territory drained by the Narraguagus, are portions of Gouldsborough, Sullivan and Franklin. The towns tributary to the Union river basin, are Tremont, Mt. Desert, Eden, Lamoine, Trenton, Hancock, Waltham, Eastbrook, Aurora, Amherst, Otis, Mariaville, Ellsworth, Surry, Bluehill, Brooklin, and parts of Franklin, Dedham, Orland and Sullivan.

The area tributary to each drainage basin, as computed from Walling's surveys, is:

Union river - - - - - -	516,250	square acres.
Penobscot river - - - - -	252,440	" "
Narraguagus river - - - -	113,510	" "

The relative position of each, is:

Drainage area of Union river - - - -	60	per cent.
Drainage area of Penobscot river - - -	26	"
Drainage area of Narraguagus river - - -	14	"

The mean rate of descent of Union river is about four feet to the mile.

About one-third of the territory actually tributary to the Union river basin, is below the "mouth of the river." The valley of this river basin is underlaid with mica schist.

48. *Coast Line.*—This is a maritime county. Its seaboard, including the incurvation of the larger bays, is of greater extent than that of any other county in the State. Its general outline is that of a great hemi-cycle, or disarranged curve line, extending from Marsh Bay, Bucksport, to Joy's Bay, Gouldsborough, and is thicker set with first-class bays, harbors and islands than any other seaboard of equal length on the American coast.

The "*meyne*," as the Indians called the main land, to distinguish it from its cordon of islands, may have suggested the name of the State. The islands by which the coast line is studded are of every size, from a "thumb-cap" to 130 square miles; while Mt. Desert Rock stands on "picket" twenty miles "broad-off," in perpetually undulating ocean, where it has roughed it for ages.

There are some 300 islands within the county's seaboard limits, 270 of which are represented on the county map. Six towns are islands, six are peninsulas, and twenty-two are salt-water washed.

49. *Light Houses.*—The following are the names of the light stations, with their numbers:

No. 10,	Prospect Harbor	5th order.
11,	Winter Harbor	5th "
12,	Mount Desert	3d "
13,	Egg Rock	4th "
14,	Baker's Island	4th "
15,	Bear Island	5th "
16,	Bass Harbor Head	5th "
17,	Burnt Coat Harbor	5th "
18,	" "	4th "
19,	Eggemoggin	5th "
20,	Saddleback Ledge	5th "
22,	Deer Isle Thoroughfare	4th "
23,	Eagle Island Point	4th "
24,	Pumpkin Island	5th "
33,	Dice's Head	4th "

Number of lighthouses within the county limits, fifteen.

Winter Harbors. Bucksport and Castine harbors are rarely frozen over. This event occurred in 1715, 1850, and during the *hyperborean* winter of 1875.

50. *Geology.*—Geologically, the rock formation underlying the county is granite, sienite and gneiss. This formation comes to the surface, and starting from Deer Isle, curves through Bluehill, Sedgwick, Brooksville, Orland, North Ellsworth, No. 8, Franklin, Sullivan, ending at Mt. Desert. This immense belt of granite is composed largely of white feldspar, is free from impurities, and makes a handsome stone when dressed. In Eden, there is a deposit of red granite. Most of the granite in Bucksport, Orland, Dedham, Waltham, Eastbrook, and those huge boulders at Ellsworth Falls, is a porphyritic (hard) variety, with black mica. Within the horse-shoe shaped circle of granite, which curves from Deer Isle to Mt. Desert, the rock is mostly mica schist, or a mimaceous state. The most abundant variety of mica schist, is that which consists of alternate layers of mica and quartz.

It indicates the presence of gold rather than coal. The rock formation in Hancock, Lamoine, Trenton, South Ellsworth, Surry and Penobscot, are considered by geologists, as belonging to one formation, and as formed during the same geological period.

At Buck's Harbor in Brooksville, Green's Landing in Deer Isle, McHeard's in Bluehill, Somes' Sound in Mt. Desert, Sullivan and Franklin, the granite crops in massive form. At Castine, Penobscot, Ellsworth and Surry, are vast deposits of plastic clay. That there are precious stones and valuable mineral deposits awaiting only scientific exploration to develop, is legibly written on its strata.

51. *Drift.*—The whole surface of the county is termed by geologists as "glaciated surface," the soil of which is predicated upon a single geological formation, called "drift." The course of this drift, as shown by the striæ, or scratches upon the ledges, has a variation of from N. 5° W. to N. 15° E. At Ellsworth its general direction is N. 15° W., while at Hancock it is N. 15° E. The mountains in Dedham, no doubt, are the parent-homes of those large boulders on the stage road above Ellsworth Falls village. From what "centre of dispersion" all the other rock have come, which are deposited all over the county in such wild and profuse confusion, some Agassiz must tell. The history of Glacial Phenomena in Hancock, is one of special interest.

52. *Granite.*—Immense ranges of it traverse the county, and it is immense in amount. It is quarried at Mt. Desert, Sullivan, Bluehill, Deer Isle, Franklin and Brooksville, and being near the sea-shore, are conveniently accessible. They are easily wrought, and the working and exportation of them have become a business of great importance. Red granite has been found at Eden and at Tremont, and is attracting the attention of capitalists.

53. *Marble.*—Verd Antique (ancient green) Marble occurs at Deer Isle. It is sometimes called "serpentine" from its mottled appearance, somewhat resembling the skin of a snake. It is susceptible of a high polish. If it will

quarry without "fault," it is of rare value. Statuary marble, milk white, is reported at Eden and at Mt. Desert.

54. MINERALS AND ORES. *Brooksville.*—Iron Pyrites, known as *fool's gold.* Copperas, sulphur, alum, and carbonate of soda can be manufactured from it.

-*Bluehill.*—Fluor spar used in chemistry. Yalena, or ore of lead. Wolfram, the ore of tin. Hydrate of Silica, suitable for fire-proof brick. An enormous bed of Manganese, Limestone, Phosphate of Lime, of which superphosphate is made.

Bucksport.—Limestone, clay slate of which school slates are made. Quartz used in the manufacture of glass.

Castine.—Quartz, argillaceous slate, plastic clay, first quality for brick-making.

Deer Isle. Asbestos (unchanged by fire), incombustible paper, gloves for handling heated metals, and fire-proof safes are manufactured from it. The ancients made a cloth of it, in which dead bodies were wrapped before the burning, and thus saved the ashes. It was used for lamp wicks. Novaculite, oil stones and hones are made of it. Limestone.

The county having been favored with little more than a revenue cutter geological exploration, comparatively nothing is known of the minerals and metallic ores, that are of value in the arts. The only lime rock discovered which is not too metaphoric to be of value, is at Little Deer Isle. Red sienite has recently been found at Tremont, which may be wrought into elegant articles of ornament, and it will take a fine and durable polish. A deposit of granular quartz occurs in Surry. Veins of zinc and copper occur in No. 7, and in Gouldsboro'. Bog iron occurs in almost every town. Gold has been found in Bucksport, Orland and Surry; mining must determine the abundance. The structure of our rocks does not indicate the presence of coal, yet there are recent geological observations which imply that anthracite coal will be found.

55. *Mineral Springs.*—Those known to the writer, are at Bucksport, Brooksville, Bluehill and Mt. Desert. The waters

of each are chalybeate, and are strongly charged with iron. They deposit an ore resembling yellow ochre, from which red paint may be readily made. These waters are said to possess medical efficacy in the treatment of chronic and inflammatory ailments.

56. *Salt*.—For the manufacture of sea-water salt, we have superior facilities. Sea water contains 3 per cent. of pure salt. With the many "land-locked" salt water storage basins, having a mean of thirteen feet of tidal rise and fall, and being accessible to market by the cheapest form of transportation, the making of salt, especially to supply the demand for it as a fertilizer, is no small item of our mineral resources.

57. *Sea-Weed*.—The marine plants, eel-grass, rock-weed and kelp, grow in abundance along our shores. As a manure they are applied in various ways. Sea-weed dried and pressed into bales, may hereafter become a portable article of commercial importance. The constituents of sea-weed are lime, 9.60; magnesia, 6.65; potash, 20; soda, 4.58; salt, 24.33; sulphuric acid, 21.97; and carbonic acid, 6.39. From the ashes iodine is obtained, which is employed medicinally.

58. *Ice*.—For a supply of export ice, we have a fresh water pond surface of more than 50,000 square acres; enough to cool the torrid markets of the world. At no distant day, the cutting of ice will become a source of material wealth. Active operations have been made at Mt. Desert, Lamoine, Gouldsborough and Bucksport. With the present margin of profit, and the close competition, the ice field must not be remote from the place of shipment.

MARITIME.

Under this heading, those industries are stimulated by the sea which washes our shores, and the rivers that water its interior.

From the earliest settlements of the county, the character of its inhabitants has been, in a great proportion, that of a maritime, lumbering and fishing people. Its numerous bays and harbors, its abundant material for vessel building, its area of timber lands, with almost limitless quantities of lumber, and the immense number of fishes which frequented the coast, were exciting, and inciting temptations to engage in these several pursuits, and to give to the county a "stern-chase" agriculture.

As "crows the old cock, so crows the young." Our young men, taking cue from the fathers, keep afresh the "old love" for the logging swamp and ocean wave, preferring the activity of the one and the excitement of the other, to the more quiet scenes of the farm.

58. *Coastwise Trade.*—The complex nature of this industry, renders it impossible to ascertain with any degree of precision its real status.

The custom-house will exhibit the amount of the foreign imports and exports; but this will be far from affording an adequate idea of the actual foreign trade. Many cargoes entered in our ports are shipped coastwise, and reshipped for their final markets. Most of the sugar-box shooks manufactured here are shipped to Portland, and reshipped to their final destination. So foreign articles, consumed here, as sugar, tea, coffee, etc., are taken from subdivided cargoes in coastwise ports. So with the coaster traffic, as wood, staves, and hoop-poles, for Rockland, long lumber and short, bark and bricks, for domestic ports. The amount of capital invested in the manufacture of lumber in Hancock County reaches the sum of $700,000. As a tolerable index to the commercial importance of the county, and to the tonnage employed in its foreign coasting and fishing trade, herewith are given its commercial ports.

59. *Custom Districts.* There are two custom districts, two ports of entry, six deputy districts, eight ports of delivery, twenty-six hailing ports, and thirteen United States custom house officials.

60. *The Forests.*—Originally, pine, spruce, hemlock, birch, beech, maple, ash, cedar, red oak, and hackmatack, were abundant. But the waster of "God's first temples" came, and before the insatiable chopper's axe the primeval forests have

disappeared, until, excepting the upper branches of Union river, scarcely a representative tree is left, and our once well timbered county, in its old growth is almost treeless; while the demands for stave timber, box stuff, vessel wedges, and fuel for lime kilns, are rapidly divesting it of its second growth.

While lumbering is classified as an industry, it is one which creates not a distributive but a centralized wealth, in which but one in thirty share, while the twenty-nine are pursued by hard times, like "Actæn by his own hounds." It engenders a upas atmosphere, in which agriculture does not thrive.

61. *The Fisheries.*—One of the most valuable industries, stripped of the peculiar nomenclature of *ichthyology*, are treated as fisheries of the deep-sea, harbor, and interior.

No person can sail along our coast, or explore our bays and harbors, or travel over our territory and examine the numerous rivers and ponds, without being struck with the uncommon chances for marine and other fisheries.

The chain of fishing banks led the European to our coasts in search of the last refuge and hiding place of the everywhere hunted codfish. Fish caught in the waters of Maine, saved the Plymouth Colony from starvation.

62. *The Deep-Sea Fishes* include the cod, pollock, hake, haddock, halibut, and mackerel. In the cod and mackerel fisheries, some 4,000 of vessel tonnage are employed. Custom house returns for 1874, show a product as follows:

Codfish cured 38,099 cwt. - -	Cash value	$164,625
Mackerel. 11,800 " - - - -	"	89,820
Hake, haddock and pollock, 15,000 cwt.	"	25.200
Total - - - - - -		$276,645

By a new process, haddock are converted into a very marketable article, known as "finnie haddie," which gives to the catching of this kind of fish a commercial value hitherto unknown.

63. *Boat-Fishing.*—The trade in fresh fish, caught and brought in open boats, is usually overlooked in the statistics of this industry. Many of the inhabitants upon the outer islands subsist chiefly by supplying the maritime towns with

fresh cod, hake and haddock. At Lunt's Long Island, women are seen almost daily rowing "cross or open handed" on their way to the fishing grounds. Many of them are "high-line" fisher *men*. Returns show this domestic deep-sea fishing to have yielded 444,000 pounds, valued at $8,880.

64. *Herring.*—This branch of fishing, scarcely second to any in commercial importance, is sub-divided,—the summer Magdalen herring fishing—the winter Grand Menan and the harbor weirs. The data at hand, show the weir and summer catch as 330,350 boxes; value, $80,487. The Magdalen and Grand Menan herring fishing is conducted principally by the people of Lamoine and Swan's Island. On the return of the fishing vessels, with good "fares," the "washing out," stringing, smoking and boxing of the herring, make a lively time.

65. *Harbor Fishing.*—This includes the porgie, lobster, smelt, eels, frost-fish, flounders, clams and scollops.

66. *Porgies.*—This migratory fish, which "schools" in our waters in illimitable numbers, has opened a new industry, in the productions of oil, fertilizers and sheep feed. They come in July and stay until into October. But a few years since, they were thought to be inedible and valueless, except for mackerel bait. Accident developed their oil-yielding gift. The yield of oil is about 12½ per cent. of their live weight. The residuum left after expressing the oil, or the "chum" as it is known in our vernacular, properly prepared, is a fertilizer without a peer. In its crude condition, as it comes from the oil-press, its fertilizing properties are from four to six times as powerful as farm yard deposits.

The greater and more valuable of its plant-food is its nitrogen. The aptitude of this valuable constituent to "fly off" and "waste its odors in the desert air," when chum is left in heaps exposed to a scorching sun and searching winds, for a long time, escaped the observation of all concerned. A *smelling* acquaintance will unerringly tell when chum is decomposing and throwing off its golden nitrogen. This exposure-loss is more than half of its money value. The greatest value of chum is a sheep feed, for which it is prepared by sun drying. This process reduces its original weight 75 per cent., equivalent to an increase of its weight of common barn manure. As a sheep feed, its nutrient properties chemically considered, are those known as "fat-formers." Formerly porgies were caught in nets, but now are taken in seines. From 400 to 600 tons of chum are made annually within the county limits. W. A. Friend, Brooklin, estimates the yearly cash value of raw chum at $6,000. The experience of the writer is that the feeding value of one ton of cured chum, is equal to that of thirty-six bushels of corn.

When porgie or herring chum, as a feed or a fertilizer, is so prepared as to conserve its nitrogen, or ammonia, its agricultural value is much greater than its present commercial value; otherwise its commercial value is more than its agricultural. Estimating a ton of fresh animal manure at $5.77, a corresponding value for chum is $34.62.

The porgie catch in the State last season, employed 94 sail vessels, 17 steamers, 700 men, and a capital of $650,000. The largest seines are 200 fathoms long, by 30 fathoms deep.

Experiments made at the Massachusetts Agricultural College, by applying ether to dried chum, show that the hydraulic pressure employed at the factories, expresses but a trifle more than 70 per cent. of the oil.

A patent has recently been obtained for preparing porgie chum as a sheep feed. Yet no one with *sconce* enough to sun-dry fresh chum, need pay a royalty to a patentee.

67. *Lobsters.*—As lobsters are found only on this side of Cape Cod, and the demand for their luxurious flesh is immense; this makes a very great business for our county people. Packing and canning establishments are in successful operation at Castine, Deer Isle, Brooklin, Gouldsboro', Mt. Desert and Cranberry Isles, and at other points. The aggregate value of this production reaches a value of $52,000.

68. *Smelts.*—The catch, chiefly, of these little but delicious fishes, is in Bagaduce river and Patten's Bay. The smelt and frost-fish are unlike. The season of smelt-fishing begins as soon as the ice is sufficiently firm to carry the

catchers. Each has a "seven by nine," cotton cloth covered fish-house, with a floor and a stove. An average day's catch nets the fisher $2.50. Hundreds of these snow-white fish houses speck the *ice*scape, and resemble the tents of an army encampment. The yearly production is $30,000.

69. *Frost-Fish.*—The principal branch of this fishing is at the Bucksport and Verona bridge. For the rental right to this fishing ground, as high as $1,300 per year has been paid. The yearly product in cash value for frost-fish, flounders, eels and scallops, is $11,000. The value of other fish is $20,200. Clams 966 bbls., $32,500.

70. *River Fisheries.*—These include such of the anadromous fishes as the alewives, shad and salmon. While the alewive belongs to the herring family, it spawns in fresh water. The shad, of the same family, is a very timid fish. The salmon, esteemed for their delicacy of flesh, is the largest and most valuable. Until a comparatively recent period, the rivers of this county fairly swarmed with them.

Salmon fishing is now confined to the Penobscot and Bagaduce rivers. In olden times the most abundant fish in our rivers, was the shad, and next the salmon. Alewives were exceedingly abundant. River fishing at the present, is almost confined to weirs, which cost some $80 each. Between Bucksport and Castine, both inclusive, there are ninety-two weirs.

The most productive weir of which we have any information, is that at the entrance of Castine harbor, which produces in one year more than 1,600 pounds of salmon. From Castine to Orland the average catch is set at fifty per weir. In Verona the best weirs yield about 100 each. Above Bucksport it falls to thirty each. The breeding grounds of alewives are in the ponds on Eastern river, Walker's pond in Brooksville, and Patten's ponds in Surry. Formerly Union river was a favorite haunt of salmon, shad and alewives.

Upon the presence of the anadromous fishes in our rivers and ponds, depends the existence of cod, haddock and pollock in our bays. The relationships are those of cause and effect.

71. *Fish Farming*, or Fish Culture, or Pisciculture, by whichever of these terms it is known, is not a new but a re-discovered art. Its practical meaning is a restocking of our ponds with fish. These were once prolific in all the kinds of migratory fish, such as pickerel, perch, bass, shad, salmon, alewives, togue and trout.

No one, having a knowledge of the habits of these fishes, can inspect our vast lacustrine surface, with its cold, limpid waters, without being impressed with the extent and magnitude of our county's *fish farm.*

The only reliable data which we can recall to show the remunerative harvests which these non-productive waters may be made to yield, is the river Tay, in Scotland, which for seven years has afforded to the riparian an annual average of $74,616. Now for a comparison: In the same ratio which that river has been made to yield of restocked fish, Patten's ponds in Surry would produce yearly, in cash value, $660
Toddy ponds 1,000
Union river and tributaries.................... 24,000
When our fish farms are once *seeded*, it is perpetual.

Commissioner Stanley says that Patten's ponds are of the best salmon producing ponds in the State.

For what is being done to restock our waters, read the accompanying letter of Ex-State Fish Commissioner Atkins. I commend its careful perusal:

> "*Penobscot Salmon Breeding Works.*—This institution, situated in Bucksport, on Spofford's brook, one mile from the Penobscot river, was founded in 1872. Its object is to collect salmon eggs for use in restocking exhausted salmon rivers. The present patrons of the enterprise are the Commissioner of Fish and Fisheries of the United States, and the Commissioners of Maine, Massachusetts, New Hampshire, Vermont, Rhode Island, Connecticut and Michigan, all acting in behalf of their several governments, and using the eggs obtained to restock public waters.
>
> The mode of operating is as follows: In June or July, six or seven hundered salmon are bought alive from the fishermen near Bucksport, and transferred to a small pond, known as 'Great Pond,' where they are kept until the last of October, when they begin to lay their eggs. They are then taken from the pond, and deprived of their eggs by manual pressure. The eggs are fecundated by the application of milt from the male fish,

and deposited in hatching troughs, where they lie until sufficiently developed to admit of being packed up in moss and transported to the several places where they are to be hatched out. This transportation is effected in February and March, and they hatch soon after.

The number of eggs obtained in 1872 was 1,560,000, and the number of young fish obtained from them, and distributed, was 876,000. In 1873, the number of eggs obtained was about 2,400,000, and so great success has attended their development that they cannot fail to yield about 2,000,000 of young salmon. The expenditure in 1872–3, was about $7,800, and in 1873–4, about $6,500. Considerable parts of these sums were for buildings and fixtures. The hatching house is seventy feet by twenty-eight, and with its present fixtures has a capacity sufficient for the development of four and a half millions of eggs."

Last year (1875) some 2,000,000 salmon eggs were distributed from these works, and planted in other waters of Maine. Craig's pond in Orland, was stocked with salmon in 1873, and Phillips' pond in Dedham, with black bass, a year or two earlier. This season, fish-ways were constructed in the outlet of Patten's pond, in Surry.

72. *Oil.*—The yearly yield of fish oil for 1873, as per data, was, of cod, hake and porgie, 32,174 gallons, having a market value of $27,245. Of this sum, $20,000 was for porgie oil. Thus we have:

Deep-sea production, value - - - - -	$296,645
Boat fishing - - - - - - - - - - -	8,880
Harbor fishing - - - - - - - - - -	211,987
Oil - - - - - - - - - - - - - - -	27,345
Total value - - - - - - - -	$544,857

Fish-farming, or the propagation of fish in our rivers and ponds, though in its infancy, is big with promise. It is said that four Indians took 2,000 pounds of pickerel from Scammon's pond in Eastbrook, in one week.

73. Water Power.—The Hydrographic Survey of the State gives our combined area of pond surface, as 11 per cent. above the proportion due to our size. Subjoined is a list of those of the first and second rank.

Aurora.—Giles' and Middle Branch.

Bucksport.—William, Bucks, McCurtis, Reed, Long, Hancock, Great, and sections of Brewer's and Moulton's.

Bluehill. — First, Second, Third, Fourth, Noyes and Guptill's.

Brooksville. — Walker's, Parker's, Blodgett's, Snake and Bakemans, a salt water pond.

Deer Isle.—Torrey's.

Dedham. — Reed's, Goose, Rocky, Mitchell's, Allen's, Fitz's, Mountain, Hat Case, and section of Moulton's, and Rocky No. 2.

Ellsworth.—Branch, Reed's, and section of Patten's.

Eden.—Eagle.

Eastbrook.—Molasses, Abram's and section of Webb's and Scammon's.

Franklin.—George's, Taunton and section of Donnels'.

Gouldsboro'.—Jones and Forbes.

Lamoine.—Blunt's, a natural curiosity.

Mariaville.—Section of Hopkins'.

Mt. Desert.—Hallocks, Jordans', and section of Great Denings, and Round.

Otis.—Floods', Beach Hill, and section of Spring, and Rocky.

Orland.—Alamasook, Craig's, Rocky, Heart, Hot Hole, section of Toddy, and Pattens.

Penobscot.—Pierces, North Bay, and section of Toddy.

Sedgwick.—Frost's and Orcutt's.

Surry.—Sections of Upper Patten, Lower Patten and Toddy.

Sullivan.—Flanders, Morancy and Simpson's.

Tremont.—Seal Cove, and section of Great and Denings.

Waltham.—Little, and section of Webb's.

No. 10. Great Tunk, Long, Fox, Rocky, Downing and section of Spring Run and Round.

No. 21, Spectacle; No. 22, Rocky; No. 33, Great; No. 34, Alligator Lake; No. 40, section of Abamgamook and Nicartou Lakes.

Whole number of powers which may be worked all the year, 92.

Working energy equal to a population of 1,000,000.

TOWNS.	No. of Powers.	Maximum height of fall.	Minimum height of fall.	Work all the year.
Amherst	6	7 feet.	7 feet.	2
Bluehill	9	14 "	9 "	4
Brooksville	8	18 "	9 "	2
Bucksport	9	19 "	11 "	7
Castine	1	12 "	12 "	1
Cranberry Isles	1	–	–	1
Dedham	5	15 "	12 "	5
Deer Isle	–	–	–	–
Eastbrook	2	10 "	10 "	2
Eden	4	–	–	
Ellsworth	39	11 "	9 "	39
Franklin	6	12 "	10 "	2
Gouldsboro'	4	30 "	15 "	4
Hancock	3	10 "	10 "	1
Mariaville	5	–	–	1
Mt. Desert	4	–	–	–
Orland	16	15 "	12 "	16
Penobscot	7	10 "	10 "	2
Sedgwick	5	–	–	2
Sullivan	9	20 "	10 "	3
Surry	9	30 "	11 "	9
Tremont	10	12 "	10 "	8
Trenton	1	–	–	–
Verona	2	12 "	12 "	2
Waltham	2	10 "	10 "	2
Nos. 3-4-7-10-35-40-41	20	18 "	10 "	11

Agricultural Features and Practices.

74. The best of the feast has been saved, to be served in the second course.

A primary farming county, this can never hope to be. There are natural obstacles, which art cannot remove. Its peculiar proximity to the ocean, its geographical position as the battle-ground of arctic and torrid temperatures, with their alternating climatic waves of heat and cold, producing long, cold, and uncertain springs, with irregular extremes of thawing and freezing, so fatal to grass roots, the inexhaustible hydraulic power within its borders, the facilities for coasting and fishing, and the extraordinary aversion to farm labor, become characteristics in common, which forbid a prosperous and productive agriculture.

Could our water power be utilized, it would invigorate agriculture and make it remunerative.

We have some good farms and farmers, but those are the exceptions, limited in consequence of the wrong direction in which our practical farming has been progressing, *i. e.* in the direction of grain growing and hoed crops, rather than grazing, dairying, and mutton growing.

Accounting for 10 per cent. of improved land in tillage, and occupied by buildings, leaves for crops as follows: 65,306 acres in hay; 1,892 acres in potatoes; 1,091 acres in barley; 1,637 acres in oats; 270 acres in wheat; 250 acres in corn. Those to every fifty-three improved acres; one cow to every seventeen improved acres, or one cow to every six and one-third inhabitants.

75. *Area.*—The whole surface area of the county, as shown by Colton's map, is:

Whole area - - - - - - -	1,632,000	square miles.
Land area - - - - - - - - -	904,528	"
Ocean area - - - - - - - -	637,472	"
Pond area - - - - - - - - -	90,000	"
Island area - - - - - - - -	100,000	"

The relative proportion of each is:

Land area - - - - - - - -	62½	per cent.
Ocean area - - - - - - -	30	"
Pond area - - - - - - - -	7½	"
Island area - - - - - - -	11½	"

Other areas:

Wild land area - - - - -	530,499	square acres.
River basin area - - -	104,068	"
Area in farms (improved) - -	103,538	"
Area in pasture - - - - - -	73,483	"
Area in fire-wood lots - - -	80,483	"
Area in highways - - - - -	2,100	"

The cash value of farms, stock and implements, is:

Farms - - - - - - - - - - -	$3,032,269
Stock - - - - - - - - - - - -	802,934
Implements - - - - - - - - - -	245,000
Poultry - - - - - - - - - - - -	75,000
Capital embarked in agriculture - - - -	$4,155,203

Density of population, one inhabitant to every 25 square acres.

76. *Crops.*—

Farm Crops.	Amount.	Price.	Value.
Wheat,	2,999 bushels,	$2.00 per bush.	$5,998
Rye,	131 "	1.00 "	131
Corn,	5,971 "	1.05 "	6,259
Oats,	34,396 "	.70 "	24,077
Barley,	32,798 "	.90 "	29,518
Buckwheat,	610 "	1.00 "	610
Potatoes,	221,379 "	.50 "	110,689
Wool,	72,827 lbs.	.40 per lb.	29,130
Peas and Beans,	9,864 bush.	2.00 per bush.	19,728
Butter,	531,997 lbs.	.40 per lb.	212,798
Cheese,	10,596 lbs.	.20 "	2,119
Milk sold,	21,844 gals.	.20 per gal.	4,368
Hay,	32,653 tons,	14.00 per ton,	457,142
Honey,	5,673 lbs.	.25 per lb.	1,418
Eggs,	640,000 doz.	.20 per doz.	128,000
Cranberries,	2,000 bush.	3.50 per bush.	7,000
One-tenth of the horses or colts sold annually, $30 per head,			5,585
One-fourth of the sheep sold annually, $3.25 per head			16,250
Pigs and pork			2,000
Orchards			10,617
Slaughtered animals			130,845
Poultry sold			48,000
Other products			49,235
Total value of farm products			$1,266,989

Which would be $4.80 per acre for all the field and pasture land in the county. The average number of acres in each farm being 70, it follows that the average annual surplus of the farm is $336.

The proportion of cows to aggregate stock, is 37 per cent. In 1860, butter per cow, 82 lbs. In 1870, per cow, 92 lbs. In 1873, per cow, 109 lbs. Number of cows, 5,777; number of oxen, 2,399; number of other cattle, 5,103; number of horses, 1,958; number of sheep, 20,084.

The tendency of grain growing for the last decade, as shown by the census returns (which are not entitled to implicit confidence so long as there are so many units of measure as there are points of compass), are, in 1860, taking rank as follows, and in 1873 as follows:

In 1860.	In 1873.	Crop rep. by		rep. in 1873.
1. Oats,	1. Oats, 100 in 1860,	Oats,	100 by	.64
2. Wheat,	2. Barley,	Barley,	100	1.02
3. Barley,	3. Corn,	Corn,	100	.34
4. Corn,	4. Wheat,	Wheat,	100	.42
5. Rye,	5. Rye,	Rye,	100	.17

Total bushels of grain in 1860, 110,420. Total in 1873, 76,296, or a decrease of 30 per cent.

The lessons which these data teach are, first, that our county is growing out of grain-growing, barley excepted; second, that a reduction of 83 per cent. in the rye crop in 13 years, shows that the soil is being cropped of its available nitrogen, so easily supplied by marine manuring, hence the falling off in wheat and corn.

As our farming seems to be going from grain growing, in what direction is it trending?

The increased product of cranberries in thirteen years is	400	per cent.
Poultry and eggs	200	"
Cattle in value	45	"
Orchard products	42	"
Butter in pounds	32	"
Mutton	23	"
The increase in butter per cow, from 1870 to 1873, is	11¾	"
Milk	11	"

Thus the statistical trend of our farming is to cranberries, grazing, butter, apples and eggs.

Along the indentations in its dividing ridges of highlands, the soil has the elements for growing winter wheat profitably. The drift on its numerous hill-sides, makes many a rocky acre admirably calculated for orcharding, for growing those choice winter varieties of apples for which there ever is a hungry demand. The general condition of its surface is that of a dairy and mutton growing, or grazing district, while there is hardly a town in the county without its cranberry area, of greater or less extent.

The past ten years' ratio of increased cranberry culture, carried forward, at the expiration of twenty-five years will give a product of $70,000.

Of the county area which is now unimproved, one-half of it may be set out as profitable for pasturage only, grazing ground for a million sheep. The half remaining would make 4,892 farms of seventy acres each.

The topography of the surface of the county, and the lithological character of the soil, mark the characteristics of its agricultural capacity as a grazing district. The hilly nature of the land points to grazing as the true method whereby the land shall be made profitable. Grain should be grown only as an exceptional crop, secondary to the increased productiveness of the land for the growth of hay. The precipitous hillside, where cattle have to "shin up" to gather the scanty herbage, should grow wood.

77. *Orchards.*—In orchard acreage Dedham stands first, and of winter fruit, Bucksport next; while every town can show more or less of thrifty trees. The large, gnarled, moss-covered apple trees which stand in close proximity to the "potato-holes" of the early settlers, show that they find favorable conditions of growth in our soil and climate.

The county did not escape the apple tree cyclone which swept over the State. Its investment in New York trees, trustworthy estimates put at $175,000. A profitable orchard is within the reach of every farmer, by as plain and simple means as a crop of potatoes. For position, select a northern slope. The cardinal conditions of success, are varieties, proximity, and culture. Plant "iron clads," or such varieties as are known to be hardy. For hardiness and ability to withstand our climatic extremes, the following varieties can be commended:

For summer apples, Tetofsky, Red Astrachan, Sops of Wine, Nodhead, Early Harvest, and Williams' Favorite.

For fall apples, Duchess of Oldenburg, Porter, Gravenstein, St. Lawrence and Fameuse.

For winter apples, Northern Spy, Granite Beauty, Talman's Sweet, Rhode Island Greening, Baldwin, and Spitzenburgh. Of crab apples, the Dartmouth and Aucubafoila are upright growers, large and handsome. The fruit is of fair eating size.

The best orchards in Aroostook and in New Brunswick, have 680 trees to an acre. A very prolific orchard at Orono, has 2,500 trees on five acres. Twelve feet apart, each way, will give 302 trees to an acre. Ten feet apart, 435; eight feet apart, 680.

Mr. Soule of Gouldsborough, one of our oldest and most successful orchardists, says: "I am satisfied there is no part of the New England States, where better fruit can be grown, or where fruit growing can be made more profitable, than in Eastern Maine." Rev. L. Gott, an orchardist of large experience, and a close observer, writes, "there is quite as much in the soil, mode of preparation, planting of trees and proper care afterward, to insure success, as in the selection of varieties."

78. *Grapes.*—Grape culture has received but limited attention. Those varieties which are quite sure to ripen in "open" culture, are the Northern Muscadine, Clinton, Hartford Prolific, Delaware, Rebecca, Blood's Seedling, Adirondac and Salem. The Northern Muscadine has a foxy taste, which is objectionable, while the Clinton is apt to mildew. With little care and at slight expense, any family can grow grapes enough for domestic use.

79. *Cranberries.*—There are thousands of acres of low, wet, swampy lands in the county, utterly worthless for general cultivation, that are admirably suited to the cranberry, and when we remember that they yield from 100 to 400 bushels per acre, and sell for from two dollars to six dollars per bushel, it is a wonder that no more of such worthless tracts are put into cranberries.

Hundreds of bushels of cultivated cranberries are grown in Surry, Lamoine, Hancock, Franklin and Eden, with lesser quantities in many other towns. The principal varieties cultivated, are the Cherry and the Bell. The Cherry is the most productive, but it is not as hardy as the Bell. It is an established fact, that no other soil than the *alluvium* soil, made by deposits from the overflow or wash of water, combined with silex, or sand (the meal of granite), will successfully grow the cranberry. Considering the number and extent of bogs and marshes which contain silex, or sand in the desired proportion, the growing of this valuable fruit must become one of our best future industries. The power to flood or drain at will, insures the best returns. The productiveness of a patch, in most cases, is largely increased by sanding, which can be done in winter. Beach sand is the best.

80. *Poultry.*—The production of eggs, is of greater importance than people imagine, and as a branch of domestic industry, should receive great care and attention. The amount produced in this county last year (1875) is not a matter of estimate only, for we have some statistics in regard to it. The quantity of eggs received by the dealers, in three towns, last year, was 78,380 dozens, which in the same proportion, give, for the county, 640,000 dozens. Large, and wonderful as these figures are, judging from shipments, of which no data can be had, this enormous amount is below, rather than above, the actual production. While the eggs produced in the great State of New York do not one-half supply the consumption of New York City alone, it is safe to assume that the supply will not glut the market.

Orland sent to market 77,800 dozen eggs, which sold at an average of twenty-five cents, making a total of $19,450.

For breeds we have Leghorn, Black Spanish, Brahmas, Light and Dark, and "Natives," or properly Mongrels.

Which is the best breed, no sane writer, without an "Accident Life Policy," will presume to say. The present drift of preferment, is toward the White Leghorn and White Brahmas. Yet, but few of our farmers have come to realize the value of a breed, or of the net cash profit of hens, when properly fed and furnished. My experience is, that there is nothing in the shape of live stock reared on our farms, considering the outlay, that compares with them for profit; yet very many only look upon them as a necessary evil, to be endured because the "women folks want them."

81. *Butter.*—Every farmer's wife knows how to make butter, but their name is not legion that can make the "gilt-edged," or even an article which will keep sweet and good for a year.

Money making in butter making, involves a judicious selection of dairy breeds; for while some butter can be made from any breed, certain breeds seem to be gotten up specifically for that unctuous purpose. Till quite recently, no special effort has been made to introduce a class of purely dairy animals. Whatever infusion of "blood" there may have been, has been with special reference to girt and weight, the market demand being for large and heavy oxen. The growing scarcity of lumber, and the substitution of horses, have removed this demand, and turned attention to a class of stock bred for dairy purposes. This has caused the introduction of many animals of high grade; but the only "Herd Register" animals are Ayrshires, by Frank Buck, Orland; Jersey, by H. H. Clark, Tremont, and Shorthorns, by H. Davis, Ellsworth. Popular favor seems to lean toward a Jersey grade.

While the value and influence of thoroughbreds are of prime importance, and should not be undervalued, the management of cows is no less a *first* requisite to successful dairy husbandry. One not having given close attention to the influence of abundant and good feeding, adapted to the special object of producing butter, has no conception of how much any cow can be made to increase her yield; nor no less prepared are most dairymen to accept the difference in yield of different cows, with the same feed.

The difference is very great; oftentimes while one cow is producing a hundred pounds, another feeding out of the same crib, is making but fifty pounds. This difference is attributable, chiefly, to two causes: 1st—Some cows, from causes unknown, appropriate the butterous constituents in their food to fat, or as *fuel*, to keep up animal heat, or to some purpose other than butter. 2d—In all milk as it comes from the cow, the butter particles are held in suspension, or are floating all through the "mess." With the milk of some, as soon as it is at rest, all of the butter particles—oil-like—rise to the surface as cream; while in the milk of others, but part of these particles ever reach the surface, but remain floating all through the "mess," and are lost, unless the milk is churned. Strictly speaking, no dairy-woman ever made a pound of butter—for it comes "ready-made" from the cow—but only separated it from milk by churning; and a complete separation, to obtain all of the butter, can be had only by churning the milk.

As a rule, it is safe to reckon six ounces of butter, or fifteen ounces of cheese, from a gallon of milk. With the best of cows, the sweetest feed, and the purest water, the taste and flavor of butter depends on the mode of making.

82. *Sheep.*—In 1870 the number of sheep in the county was 28,000 less than it was in 1840; and yet, it is one of the best natural sheep-ranges in New England.

If there may be "sermons in stones," there are whole *tones* of significance in these figures; for by a subsequent showing, the decrease in sheep, is an accurate archetype of the decrease of the staple crops. The decrease in bushels of wheat, and in the number of sheep, about the same. The ratio is found to hold good for two years, or for thirty years. The aggregate grain crop, wheat, corn, barley, and oats, shows for the past 30 years, a per cent. of loss differing but little from the per cent. of loss in sheep for the same period. This, with other facts, evince the existence of an *umbilical* chord, which extends from flocks of sheep to fruitfulness of land.

Of our 788,000 square acres of land area, (after deducting 1-16 part to grow fuel) about 3-5, or 443,000 square acres, are natural grazing, or unnatural plow-land; while much of it, in consequence of its rough surface, and its coarse herbage, is valueless except for sheep pasturage.

If this be so, why had we 48,000 sheep in 1840, and only 20,000 in 1870? Simply for the reason, that hitherto our sheep-husbandry has been pursued exclusively with a view to the growth of *wool* rather than *mutton.* To produce the best of mutton, is our "rough land of hill, and stone, and tree," pre-eminently fitted. These thousands of acres of ours, briery, bushy pastures, should be stocked with Southdowns, the best of mutton breeds—hardy, docile and prolific.

Hundreds of these waste acres—39 acres to one sheep—stand upon the assessor's books at a value of but seventy cents an acre, which as sheep pastures would pay an interest of from $3.00 to $7.00 an acre, provided we were rid of our 2,400 dogs.

The peculiar adaptation of our soil and climate to the wants of sheep, is such that they are not liable to many forms of disease; the greatest drawback is that of ill-bred and half-fed dogs. We tax the sheep, and why don't we tax the dogs?

83. WEEDS OF HANCOCK—The most of which are natives of Europe, are:

Buttercups, *Yellow Weed*, *Ranunculusacris.*—A foreigner. Most abundant in moist seasons. It has become thoroughly naturalized all over the county. It has an acrid and bitter taste. A perennial.

Charlock, *Field Mustard*, *Brassica Sinapistrum.*—A foreigner. A noxious weed in grain fields. The seeds will remain in the ground a lifetime without losing their vitality. It is a most pestiferous plant. An annual.

Purslane, *Portulaca oleracca.*—An American weed. One of the most pernicious of garden weeds. Is so very tenacious of life that it will grow after having been kept out of the ground for weeks. Rare in the county. Annual.

Five Finger, *Cinquefoil*, *Potentilla Canadensis.*—A worthless plant, except for sheep. Its presence indicates a soil wanting in lime. Most common in badly cultivated fields. A perennial.

Caraway, *Carum carui.*—When it escapes cultivation it spreads rapidly, and becomes a troublesome weed in grass fields. It should be carefully kept within bounds. Cattle will not eat it.

Roman Wormwood, *Rag Weed*, *Bitter Weed*, *Ambrosia, artemisivefolia.*—This, in grain fields, is one of the worst of weeds. The seed will live in soil for years, and is ready to grow whenever the land is plowed. An annual.

Beggar's Lice, *Stick Seed*, *Echimrpernum lappula.*—A vexatious and obnoxious native weed, entangling the manes of horses and the fleeces of sheep. It tells of slovenly farming. An annual.

May Weed, Dog's Fennel, Tetia Chamomile, Maruta Cotula.—Came from Europe. Common in door-yards. Is employed as a substitute for chamomile. Will drive away fleas. An annual.

Common Tarrow, Milfoil, Snerzewort, Achillea, Millefolium.—A foreigner. Bad on account of its creeping roots. An ointment is made from the leaves for scab in sheep. A perennial.

White Weed, Ox-Eyed Daisy, Leucanthemum vulgare.—This omnipresent weed is an old acquaintance. The seeds will germinate after passing through all animals but sheep. A single root can produce 15,000 seeds. A perennial.

Ohio Daisy, Cone Flower, Rudbeckia hiekta.—Recently introduced in Western grass seed. Flowers large, showy and yellow. Disk purple. Stem like white weed. It is a foul weed, and the utmost care should be taken to eradicate it. A perennial.

Canada Thistle, Cursed T. Cirsium arvense.—The worst weed to destroy we have. Brought from Scotland to Canada 200 years ago, and sowed in a flower garden. A farmer not destroying thistles in his grounds should pay for keeping a nuisance. A perennial.

BURDOCK. *Lappa officinalis.*—A homely wood, not common. The burs often become entangled in the wool of sheep. The bruised leaves are said to be good for hysterics. It is easily eradicated. A biennial.

PUKE WEED, INDIAN TOBACCO, EYE BRIGHT, LOBELIA, *Lobelia inflata.*—A native. Not troublesome. Botanical doctors employ it in medicine. A remedy for lambs poisoned with lambkill. Said to cause the "slabbering" of horses. An annual.

PIG WEED. *Chenopodium album.*— The rapidity with which this weed can multiply is astonishing. A single pig weed will ripen 10,000 seeds, giving in a fifth year's progeny plants enough to cover 18,365,472,910 acres. An annual.

SMART WEED, LADY'S THUMB, SPOTTED KNOT-WEED, *Polygonum Persicaria.*—Came from Europe. It is a worthless weed, and is increasing in cultivated fields. The juice causes an inflammation of the skin. An annual.

SORREL, *Rumex Acctosella.* A foreigner; as contemptible and quite as despicable as witch grass. Its presence does not indicate that the soil is sour, and needs an alkali. Its extirpation is by high cultivation. A perennial.

BARN GRASS, COOK-FOOT PANICUM, *Panicum crus-galli.*—Came from Europe. When it has once got a good foot-hold its eradication requires the patience of Job. It is by all odds the worst of our garden pests. An annual.

LAMBKILL, SHEEP LAUREL, *Kalmia angustifolia.*—This shrub, rather than weed, is deadly poisonous to sheep and lambs, *Scribner* to the contrary, notwithstanding. It is very troublesome in many sections of the county.

FALL DANDELION, HAWBIT, *Leontodon autumnale.*—This weed is being widely disseminated throughout the county. Its blossoms appear just after haying, and continue until the frosts. A perennial.

WITCH GRASS, CONCH GRASS, QUACK GRASS, DOG GRASS, CHANDLER GRASS, *Triticum repens.*—As a troublesome weed all others pass into insignificance. Makes the best of hay if cut early and properly cured. A perennial.

Two of the pernicious weeds, the Ohio Daisy and the Fall Dandelion, are rapidly spreading over the county. The former, with pains-taking, can be checked and perhaps eradicated; the ways of the latter seem "past finding out."

84. INSECT ENEMIES IN HANCOCK.—Good farmers or bad, we are not without a full quota of insect denizens, injurious to vegetation,—bugs, borers, beetles, grasshoppers, caterpillars, cut-worms and plant lice. Those most annoying and destructive, are apple tree borers, apple tree caterpillars, codling-moths, oyster-shell lice, striped bug, turnip beetle, cabbage, cut and currant worms.

Almost all, our worst foes, have been imported from the other side of the Atlantic, and new ones, which come, are imported in some way. The annual damage done by insects, within the limits of the United States, is estimated at $300,000,000.

The BORER (*Saperda bivittata*) is ruining many an orchard where his presence is not suspected. A little scratch, like that of a pin, is made in the bark near the ground, and an egg deposited there by a miller in July. This soon hatches, and the young worm gnaws its way through the bark. At this time it can easily be destroyed. If they escape notice the first season, the second year they live out of sight, upon the newly formed wood, and are doing the damage. In about thirty-five months from the time of entering the tree, it emerges a fully grown miller. The parent miller of the borer is rarely seen by day. One would be surprised, at knowing that so many fruit trees are destroyed by this pest.

OYSTER SHELL LOUSE.—Everything considered, this insect is the most pernicious and destructive to the apple tree of any insect in our county. These lice cover the limbs and twigs with little oval shells, resembling half a grain of flaxseed, which are the lying-in houses, in each of which are deposited from 20 to 40 eggs. These begin to hatch, in this region, about the middle of June. The insect itself is very small, and looks like a speck of bluish mould. They are active only a few days. At this time they can be destroyed. A wash of soapsuds, in which tobacco has been steeped, and blue clay added, applied when the little specks can be seen, is sure death to them. Applications at all other times are useless.

The TENT CATERPILLAR.—Constant vigilance is required to keep trees freed from the troublesome creatures. The eggs are contained in cylindrical clusters, in tough, leathery, varnished coverings, which contain several hundred eggs.

The CODLING MOTH seems on the increase. This is the insect which causes wormy apples. The best known method to check their increase is to suspend vials of sweetened water, in which hundreds of the parent insects will be drowned, and in keeping the bark smooth and thrifty.

The STRIPED BUG.—This ubiquitous pest annually destroys thousands of dollars' worth of squash and cucumber vines. They often commence their work by nipping off the young sprouts before they are even out of the ground. Innumerable remedies have been published, but the only sure safeguards are cheap boxes, open at the bottom and covered with millinet on the top.

The TURNIP BEETLE, or little black bug. These are rarely destructive when marine manures are used, especially porgie chum.

The CABBAGE WORM.—Of all the insects that infest the cabbage, that valuable esculent, the most mischievous is the recently imported green worm. The French call it the "heart worm." These come from the *Rape Butterfly*, the bane of every cabbage grower of Europe. The cabbage is a marine plant, and the growing of them might be made a very lucrative business in each of our twenty-one towns, which border on the salt sea, if some method could be devised to destroy or check the increase of the exceedingly noxious rape butterflies. It is said they were brought from France to Quebec in 1858, since which time they have so increased as to destroy, in Quebec, in one year, $240,000 worth of cabbages. They are said to have first reached this State, at Bangor, in 1868. This is an error, for the writer saw thousands of them in a cabbage field of Gideon Cook's, in Waltham, in 1861. Not until about 1870 did their havoc attract attention about the mouth of Union river, since which they have become very numerous, and till some preventive can be found they promise to effectually bar the cultivation of this highly esteemed plant. Richard Perkins, of Lamoine, informs me that where he has applied salt herring scrap, the cabbages escaped the ravages of this much to be dreaded pest; and his neighbor, Warren King, had a like experience. The rape butterfly is a slow, lumbering fly, and may easily be caught.

The SAWFLY or CURRANT WORM.—This terrible pest, which thus far has baffled every effort to arrest its waste of destruction, is a newly imported insect. It is said to have appeared in the neighborhood of Rochester, N. Y. They have come eastward at the rate of about twenty-five miles a year, reaching here in 1870. They threaten a complete destruction of our currant and gooseberry bushes. To prevent their ravages, we have applied white hellebore, carbolate of lime, carbolic acid, lime and cayenne, but each is alike ineffectual. An application of milk gives some show of success. It is safe to say, that already they have destroyed four-fifths of the currant bushes in the county.

85. REAL AND IDEAL FARM PRODUCTIONS.—The following citation of figures, will give some idea of the vast disproportion which exists between the actual and the possible farm productions:

In 1870, the crop acreage of the county was—in hay, 65,306 acres; actual yield half ton per acre, or five acres required to winter a cow. A possible yield of 2 tons per acre, require 1¼ acres to winter a cow.

In potatoes, 1,892 acres; actual yield 117 bushels, at fifty cents a bushel, $58.50 per acre. A possible yield, 200 bushels per acre, or $100 to an acre.

In barley, 1,691 acres; actual yield 16 bushels, at 90 cents, $17.50 per acre. A possible yield of 30 bushels, $32.83 per acre.

In oats, 1,637 acres; actual yield 21 bushels per acre, at 60 cents, $12.62 per acre. A possible yield of 36 bushels, at same price, $21.53 per acre.

Of butter, reported yield 92 pounds per cow, at 40 cents, $36.80 per cow. A possible product of 250 pounds, same price, $100 per cow, or for "gilt-edged" butter, at 75 cents, $187.50 per cow.

A ton of hay fed to the first named cow, would give 18 pounds of butter, or $7.20 a ton for the hay; while hay to the second cow would give 45 pounds of butter, or $18.24 per ton for the hay.

An aggregate average of the above citation gives an increase of more than 200 per cent., without going far into the circle of possibilities.

What the possible scope of our acreable productions are, may be demonstrated by what has been done; and what has been done may be repeated.

In 1872, Peter C. Baker, of Orrington, grew 58 bushels of Lost Nation wheat, upon one acre; which, at $1.90 a bushel, is $110.20 per acre. The same culture applied to our area in wheat, in 1874, would give a cash return of $29,570, in lieu of what it was, $5,600.

Take butter:—At present the average is 109 pounds per cow. With a yield of 300 pounds per cow—not rare for Jerseys, Ayrshires, or well fed "natives"—would give $120 for the cash product of a cow. The famous "Ingalls cow," owned by Hon. H. Belcher, Somerset county, produced at the rate of 1,095 pounds.

The present average yield per acre, of our grain and hoed crops, is $5.78. For more years than one, Jesse Dutton of Ellsworth, has sold for cash, more than $200 worth of field crops from an acre. One season Benjamin Shute of North Hancock, grew $127 worth of onions on a half acre. In five years, G. H. Emerson of No. Castine, carried an 8 acre field from 2½ tons to 21 tons; while Monroe Young, on the old Harding farm in Trenton, and Charles Macomber, on the old Springer farm in Franklin, have increased their hay crops nearly 600 per cent.

The "possibilities," which might be multiplied, show what our soil can produce when its dormant capabilities are stirred into activity.

It is well for such as are short of manure to know that an application of nitrogen, potash, phosphoric acid, will grow extraordinary crops. These, in the cheap form of sulphate of ammonia, muriate of potash, and superphosphate, can be had of most dealers in chemicals.

86. Of Flowers.—Rev. L. Gott, of West Ellsworth, who knows whereof he affirms, writes as follows :

"A good many men in our county seem to think that cultivating flowers wont pay, and have turned that department of agriculture over to the ladies. Flowers succeed best in sandy loam, made rich with well decomposed manure, thoroughly mixed. Clay soils would be very much benefitted with a mixture of loam, and to be well spaded in the fall. What are generally termed 'half-hardy,' by the seedsmen, will grow nicely in such a soil, with the requisite knowledge in planting and getting the seed up.

Hardy Annuals.—Ageratum, varieties; Antirrhinum, Argemone; Asters, German and French, varieties; Balsams, half-hardy, Rose; Camekia and Carnation, flowered; Cacalia, Balliopsis, varieties, beautiful; Candytuft, Catchfly, Clarkia, Convolvulus, Delphimum, annual. Dianthus, Japan and China, varieties. Eschscholtzia, varieties; Gaillardia, Gilia, varieties; Hibiscus Africanus; Lavatera, Linum, scarlet and white; Lupine, Malope, half-hardy; Marigold, varieties, half-hardy; Mignonette, Mirabilis, half-hardy; Nasturtium, varieties; Nemophila, Nigella, Nolano, Pansy, English and German; Petunia, varieties, splendid; Phlox Drummondii, varieties; Portulaca, double and single, varieties; Schizanthus, half-hardy; Stock, Ten Weeks, varieties; Verbena, Whitlavia, Zinnia, Morning Glory.

Everlasting Flowers.—The most of them are half-hardy, but have been successfully grown by me. Good for winter boquets, etc. Acroclinium, varieties; Gomphrena, Helichrysum, Helipterum, varieties; Rhodanthe, Xeranthemum.

Biennials and Perennials.—Aconitum, roots poisonous; Aquilegia, varieties; Chrysanthemum, late; Delphinium, varieties; Hollyhock, varieties; Hesperis, Lychnis, varieties; Pentstemon, Sweet William, Helianthus, roots should be put in the cellar winters.

All of the above flowers have been successfully grown on my grounds. Some are more showy than others, but all of them worthy of a place.

Hardy Bulbs and tuberous Roots.—Tulips should be in every flower garden. Dicentra Spectabilis, Peony, varieties. Lilies. Bulbs and tubers that require to be kept in the cellar over winter.—Gladiolus, varieties, splendid; Dahlia, quite common; Maderia vine, Tigridia, varieties. The above varieties can be grown in this county with good results. The Gladioli family deserves a more extended cultivation."

MANUFACTURING INDUSTRIES, ETC.—As an unabridged list of the manufacturing and mechanical industries would consume a space wholly disproportionate to the importance of the information conveyed, such a comparative aggregate only is given as may show by the drift of the past the trend of the future.

In 1860 the total product of the fisheries was $236,000; in 1870, $202,000. The loss is in the Grand Bank fishing.

In 1860 the total product of wrought granite was $60,000; in 1870, $175,000. Total product of bricks in 1860, none; in 1870, $38,000.

In 1860, ice, none; in 1873, $12,000; in 1875, $21,000.

Total product of all industries to each hand employed in 1860, $667; in 1870, $1,500. This difference is not due to an increase of manufacturing establishments, but to greater skill and improved machinery.

In 1870 it required 113 men to saw as much lumber as 100 men in 1860. The increased distance which saw-logs have to be brought, notwithstanding the increase in market price within the last decade, has reduced the net product 13 per cent. in ten years. The cost of "driving" and the greater number of logs required to "scale" a thousand, are growing "outs" which narrow the margin of profit. When the lumber is exhausted, and it is only a question of time, artisan-skill and manufacturing energy will shape a new industrial system.

87. CLIMATOLOGICAL.—An abstract of the thermometrical observations taken at Surry, by Oscar Tripp, shows the average degree of greatest cold for 4 years was 12°20′ below zero, the average of greatest heat for the same 4 years, was 92°

Fahrenheit; the mean summer temperature for the same 4 years was 67° 21′, and the yearly mean 44° 44′. The annual average of temperature in the State, as ascertained at the Observatory in Portland, was 43°23′. The highest temperature was 102°; the lowest, 30° below. Thus it is shown that the "rise and fall" of the mercury, or the extremes of temperature, are less than for the State. The proximity of the ocean diminishes both the summer's heat and the winter's cold.

Hancock county being a strictly maritime region, tidal waters bordering on three of its sides, with an unusually large inland water surface, and its continental position being in the meridian of contact between the polar drift and Gulf Stream current, serve to produce a humid, vaporous atmosphere, with a greater number of hazy, misty and foggy days, than otherwise are due to such an hydrographic area.

The moist, cool, and relatively low temperature of the summer, exempt this county from the malignant form of malarious diseases.

Those which contribute to the annual mortality are of a respiratory, or pulmonary character. Of this class of diseases, 27 per cent. of the fatality are due to consumption, and 15 per cent. to typhus types of fever, leaving 58 per cent. as chargeable to some one of the remaining 122 diseases commissioned to break the "thread" of human life.

Consumption, the great destroyer here, as elsewhere, is classified as an "endemic" disease, its excessively destructive force being supposed to be due to some local cause. A search for the local cause should be neither in the humid airs swept over us by summer drafts, nor in the vapor-condensing winds from the Bay of Fundy, but in the variously contaminated air of our non-ventilated dwellings. The wonder is, not that so many, but that so few die of consumption, when so little regard is had to the purity of the air we breathe. When the dwelling houses are so arranged that there is no deficiency of pure, well oxygenated air, day and night, the decrease in consumption's death-rate will be astonishing.

This matter of ventilation has been mystified, when its principles are simple. Air enters at a lower orifice, and passes out at a higher.

88. Social Statistics.—The uncertain relation which *assessed* values bear to *selling* values, the habits of assessment in the respective towns, with the non-determinable difference in "undervaluation," and the wide difference in the amount of property, which by "exemption" and evasion escape taxation, give great uncertainty to all comparative taxable statistics.

Column 1, shows the per capita wealth, as per the assessed value.

Column 2, shows the per capita wealth as per the census value.

Column 3, shows the pauper levy on each $1,000 as the taxable value.

Column 4, shows the pauper levy on each $1,000 of the real value.

Column 5, shows the proportion of population, more than "three score and ten."

Amherst,	$165 00	$220 00	$3 78	$2 52	1-58
Aurora,	155 00	206 00	5 12	3 52	1-30
Brooklin,	200 00	266 00	2 62	1 75	1-19
Bluehill.	225 00	300 00	1 82	1 22	1-20
Brooksville,	190 00	253 00	4 14	2 76	1-22
Bucksport,	360 00	480 00	–	–	1-25
Cranberry Isles,	255 00	340 00	16	11	1-35
Castine,	355 00	470 00	4 19	2 80	1-24
Deer Isle,	120 00	150 00	4 31	2 88	–
Dedham,	230 00	306 00	–	–	–
Eden,	175 00	233 00	5 60	3 74	1-35
Ellsworth,	235 00	313 00	3 24	2 16	–
Eastbrook,	225 00	300 00	–	–	1-13
Franklin,	165 00	220 00	4 75	3 17	1-43
Gouldsboro',	130 00	173 00	2 22	1 49	1-46
Hancock,	170 00	226 00	4 10	2 77	1-23
Lamoine,	232 00	309 00	2 45	1 64	1-20
Mt. Desert,	175 00	233 00	4 42	2 98	1-24
Mariaville,	180 00	240 00	–	–	1-46
Orland,	280 00	273 00	2 93	1 96	1-22
Otis,	110 00	146 00	1 80	1 20	1-20
Penobscot,	148 00	197 00	5 52	3 68	1-24

Sullivan, - - -	$195 00	$280 00	$4 79	$3 20	1-31
Surry, - - -	172 00	292 00	2 28	1 52	1-24
Sedgwick, - - -	180 00	240 00	2 52	1 68	1-17
Tremont, - -	145 00	193 00	-	-	-
Trenton, - - -	175 00	223 00	1 15	77	1-19
Waltham, - -	160 00	213 00	-	-	-
Verona, - - -	169 00	213 00	1 46	98	1-88

By this showing, a thirtieth of our people are "70 past." This may be a good show for longevity, but it is a bad one for emigration, for it surely tells that the old folks are left at home, and the young folks have gone West.

89. Our Industrial Needs.—That which looms up the most conspicuous, and stands marked in the boldest outline, is the need of a railroad. This is the first essential to the industrial development of our county. Our vast water power, practically neglected, presents no attractions for the investiture of capital; nor can we hope for any new strides in manufactures, or for the introduction of new industries, while our "spotted lines" compete with the iron horse. Such a competition is too matchless to be ridiculous. Nor can our agriculture prosper without home markets, nor can there be home markets without home industries. So long as we are without that prime necessity—a railway—so long must we endure the pains and pangs of our chronic embarrassments.

The next industrial need is a reformatory agriculture. At the present, our agriculture seems to lay becalmed between the grain growing trade-winds of the past, and the hay producing trade-winds of the future; or in slow transition betwixt an agriculture destroyed, and an agriculture restored. The period of sluggish inaction, is really a needed healthful state of repose. It must run its course to reach a remedy, and to dispel old illusions.

Guided by the discernible landmarks in the future, our intelligent farmers will steer a course, "however the winds blow or waves churn," which leads to the production and supply of those articles for which our soils are best fitted, and wherein there can be the least competitors. The law of markets is the only law which admits of no exception. That law shows that the least competition comes from animal products; nor is there any prospect of a keen competition in the Great West for the four products of butter, cheese, eggs and mutton. In the production of these, and at remunerative prices, our farmers can set at defiance the rest of mankind.

Another need is labor saving appliances. The idea that a farm can't be profitably worked with hired help, is firmly rooted. The wages which our mills, ship-yards, quarries, vessels, and kindred industries can afford, are too inflated for the farmers; while farms worked by muscular labor have so much of apparent drudgery, that wage-laborers instinctively shun it.

No reform can be of greater utility, than such a one as shall give use to these "infringements," labor-saving implements for economizing labor, thereby rendering it more productive, and by reducing the cost of production, increasing the net profit. Labor-saving machinery is the great present need of our farmers, to elevate their pursuit from degrading physical toil to one of dignity in the social scale.

Another need is, some incentive to harness our numerous water-falls to factory wheels, and thus convert them into engines of labor to construct raw materials into the multiplied forms of finished product, known to civilized life, thereby continually renewing and continually increasing our material wealth.

A restocking our ponds with edible fish is, from any point of observation, a most pressing need. The amount of easily attainable food, wholesome, appetizing and cheap, which our deserted waters might be made to produce, at a price relatively low to the cost of production, has until quite recently escaped unseen.

To enumerate all of our needs, or portray all of our natural resources, would involve an herculean labor. Our water power, which now furnishes employment to but a thousand or more, when utilized to its full capacity, would call in more than a million souls. With such an increase in population, how all of the pulses of industry would throb with a fresher life. How the creation of home markets would throw out streams of agricultural prosperity, and irrigate the whole land with fertility. And when its inexhaustible quarries of granite, marble and quartz; its annually recurring ice-fields; its plastic clay, and its immense fish pasture are in full blast, and operated on recognized business principles, who has prophetic inspiration to forecast the wealth and prosperity of our county?

We repeat, the greatest of our industrial needs is a shore-line railroad, having its western terminus at either Castine or Bucksport, both of which have open winter harbors. During the hyperborean winter of 1874-5, for a few weeks, the ice embargoed both of these ports, but it is an embargo which the Frost King makes *but twice in a century.*

STATISTICS OF TOWNS.

92. To my own personal knowledge, I thought it proper to add the testimony of others whose experience and observation are such as to enable them to speak advisedly. To this end, letters were addressed to residents in each town in the county, in which, among other inquiries, were the following:

1st. The industrial establishments, other than lumber mills.
2d. The kind of neat stock, sheep and poultry.
3d. The varieties of apples proving hardy and productive.
4th. Minerals, and natural curiosities.
5th. Character of the soil.
6th. Number living exclusively by farming.
7th. Yearly cost of poor.
8th. Number of inhabitants 70 years of age, and over.

In almost every instance, prompt replies were made. My design originally was, to print the responses *verbatim*, but several having expressed an unwillingness to grant that liberty, I have incorporated into the appropriate sub-division, the *cream* of the replies.

Herewith are appended the names of those who have aided me by their contributions: Dr. Joseph L. Stevens, George V. Mills, David Wasson, George L. Hosmer, Hon. Wyer G. Sargent, Otis W. Herrick, Wm. Conary, Joseph M. Hutchins, B. W. Darling, Luther Lord, Oscar Tripp, Frank Buck, Rev. L. Gott, Chas. H. Atkins, Hosea B. Wardwell, Rev. H. S. Loring, Chas. P. Silsby, Chas. Otis, John S. Parsons, N. H. McFarland, Wm. H. Guptill, Dr. Robert Grindle, H. M. Soule, Richard Perkins, A. B. Berry, A. C. Miliken, Hon. Warren King, Hon. Wm. W. Bragdon, Leonard J. Thomas, H. S. Trevett, Henry N. Butler, Hon. W. E. Hadlock, L. D. Jordan, C. Wasgatt, E. B. Babson, J. C. Chilcott, Hon. A. H. Whitmore, S. T. Hinks, et als.

The deductions drawn from the correspondence are:

1st. The number of saw-mills reported, show that no branch of our manufacturing industry calls for more capital or employs so many hands. Although the 'old growth' is nearly subdued, and the days of "up-and-down" saws are nearly out of "cut," the humidity of our climate gives such a vigor and persistency to forest vegetation, that treelets swarm into occupancy of the cleared lands, and dense "second" growths supply stock for stave, shingle and box mills. For some years to come will he at the "head-stock," and he at the "tail-stock" ply their vocation. Says Dr. Grindle in his reply, "I believe it would be, in the end, a great blessing to our people if lumber were to become so cheap in the market that it would not pay to get it; for when lumbering will not afford a living they will turn their attention to some business which will pay, and at the same time increase instead of diminish their estates."

2d. The replies, as to "other industrial establishments," show by their diversity that the question was variously understood. The information desired was, as to new industries, whether artisan-skill was giving shape to any new industrial system.

Outside of the lumber mills there is no leading manufacturing industry—none which gives local character. The carriage, canning, clothing, cordage, tanning, etc., are individual, not corporative enterprises. If there is an exception, it is stone cutting.

3d. "Grades and natives" were the stereotyped answers as to stock. Of thoroughbreds the show is meagre. When size was the *desideratum* the infusion of "pure blood" was from the Shorthorns. The present tide of demand is toward Jersey and Ayrshire grades. Devons introduced a few years since, are now represented by a few grades in Gouldsborough and West Ellsworth. Unfortunately this race of cattle, remarkable for hardihood, symmetry, and beauty, were introduced when the "saw dust was too thick to see its merit."

The show of sheep is better than that of cattle. The New Leicester, or Woodstock crosses, predominate. Of pure breds, Samuel Wasson, East Surry, and the Hill Bros., East Sullivan, and Frank Buck, Orland, have Southdowns from the celebrated Thorne stock, New York. Brooksville and Brooklin have choice sheep.

The poultry,—more "breeds" were reported, than Noah ever dreamed of.

4th. "Seedlings," say the responses, are "our apples for profit." G. V. Mills, and H. M. Soule, the former, having traveled over Western Hancock more times than any living man of his years, the latter, recognized authority in Eastern Hancock, express very decided preference for "seedlings."

Of introduced varieties worthy of cultivation, a majority named the Baldwin, grafted, Northern Spy, Talman Sweeting, Red Astrachan, Duchess of Oldenburg, Rhode Island Greening, and High Top Sweet. The next in order, were Bell's Early, Porter, Nonesuch and Noosehead. The failures named are reported as chargeable "to want of care, varieties too tender, root-grafted, not true to name and *hospitals*."

5th. Most of the replies in reference to minerals, indicate that the term was taken in its strictest sense, hence most of them were unsatisfactory and not reliable.

We are geologically assured that there are metallic ores where their presence is not suspected, and in towns from which the report saith, "nothing of value."

Appended is a brief descriptive and statistical sketch of each town in the county, alphabetically arranged.

93. *Aurora* is situated on the "air line" road, 24 miles from Ellsworth and 25 miles from Bangor. It is a "six mile square." Unlike every other town in the county, it has no mills. Its soil is chiefly gravelly loam, not retentive of moisture, which can be worked earlier in the spring than any other town on the Union river. The prevailing rock is a coarse granite, which is decomposed by infiltration, and is used to "gravel" the highways. In the eastern part of the town is one of those alluvial ridges, a marvel to the geologist, known as "horsebacks." Nothing similar to it is known out of New England, unless it be known in Northern Europe.

The orchards tell of neglect. That which shows some care, is upon the farm of H. M. and B. Hall.

On reconnoitreing this, as well as all of the up-river towns, following the highway, one finds it a "hard road to travel." The roads following the settlements made upon the summits of the hardwood hills, are *summity* in the extreme. An exploration may discover lime and graphite of economic value, and possibly anthracite coal.

94. *Amherst.*—This town, like Aurora, is a six mile square. It is 22 miles N. N. E. of Ellsworth. It is highly favored in respect to water power. It has one saw, one clapboard, one grist, two shingle mills, and a large tannery. Union river divides the town. East of it is good orchard land. West of the river, excepting the interval, the soil is granitic and the surface hilly.

Near the "corner" is a high ledge, some acres in extent, of a peculiar formation. Rev. Mr. Loring writes, that among its minerals are "sulphuret of iron, crystals of quartz, slate and granite." The high ledge we suppose to be porphyry, containing crystals of iron pyrites, with compact feldspar.

In the improvement of its stock, Amherst stands unrivalled; and this is due mainly to the energy and enterprise of A. B. Buzzel. Mr. Buzzel has employed a mule team for years. The endurance of mules is wonderful; treated to cheap fare, and constant labor, yet rarely disabled or chargeable with lost time. It would be of mutual advantage to Amherst and Aurora, to put up a cheese factory at the "corner." Both towns have entered the cycle of years when farming is to be a paying pursuit. The hides used in the sole-leather tannery of Buzzel & Sons, are principally from South America and Mexico.

95. *Bluehill* is 14 miles west from Ellsworth, and is 36 miles from Bangor. From this quaint old town, old in appearance, no responses to certain inquiries were made. As seen in the light of geological discovery, this is the *mettalliferous* town of Hancock county. Bluehill mountain, when unsealed by scientific excavation, will become as interesting a locality for its minerals of value in the arts, as is Mt. Mica in Oxford for its rare minerals of beauty. Of its mineral wealth the granite only has assumed commercial value. There are four quarries, Hinckley's, Chase's, Collins', and ——, and a cemetery monument establishment, by B. W. Darling. These afford employment for 30 yoke of oxen, and 300 wage-laborers. A few years since, one of the Osgood's manufactured a quantity of manganese brick. At present it has no great value. In the granite quarried here, which is fine grained, are veins of copper, iron, fluor-spar, lead, and phosphate of lime.

As a summer resort for that class of tourists in search of quiet, good air, good water, and fine scenery, it is second to none on the coast of Maine. The same blight has struck its agriculture, which has come to all of our towns without a home market. The present need of its farmers, is a cheese factory. The soil is good, and with suitable cultivation can be made very productive.

96. *Brooklin* has one grist-mill, four porgie factories, and two herring packing-houses. It is 26 miles from Ellsworth,

and 50 miles from Bangor. Naskeag Point is an historic, reminiscent spot. There are "signs" that it was inhabited at a time and by a people of which history saith naught. The soil, says Mr. C. W. Herrick, "is strong and productive." The hard times are forcing the people to their farms, which have been sadly neglected. Orcharding, for which the soil is well adapted, should receive a deal more attention. In years gone by, when we went there wooing, Capt. Mark Dodge had a thrifty apple orchard, which was very productive. It has a good soil for cranberries, and at Centre Harbor one of the best locations for a cheese factory. Its enterprising people should advertise the attractions of Naskeag and Flye's Point, and of "Birch Land," as places of resort. Of its mineral wealth, its "rough and rugged rocks" show evidence of a paying deposit of phosphate of lime.

97. *Brooksville.*—This almost island town, is 22 miles southwest from Ellsworth, and is 40 miles from Bangor. There are two saw, two shingle, two grist, a stave and a carding mill. The granite quarry at Kench's mountain is the one first wrought in the county. We remember, in our "pinafore" days, how those who "cut stone for a living," were assigned a place in the social scale, down considerably lower than the angels. About $26,000 worth of worked stone were shipped from this quarry last year.

At Buck's Harbor (why is it so named?) is a porgie oil factory. West Brooksville is the *Coasterville* of Western Hancock. Nearly every man sails, helps to man, or is part owner of a "coaster," which gives a peculiar idiom to their language, which is perfect Greek to a backwoodsman.

Perkin's mountain is hardly second to Bluehill mountain as a locality for minerals. It is said, that some seventy years ago blacksmith coal was taken from its natural bed at the foot of the mountain, and tested on a smith's forge. Alum and copperas are abundant. At the foot of the mountain's western declivity, is a chalybeate spring.

Standing upon Wasson's hill, one is forcibly impressed that at no very remote geological period, the waters covered the whole West Brooksville flat, and that Dodge's cove was a large bay. Cape Rosier was visited by Samuel Champlain fifteen years before the landing of the Pilgrims. Walker's pond is a water picture of enchanting loveliness, while the "devil's track" in the solid granite of Kench's mountain, and the clam shells on Dodge's and Henry's Points, afford themes for the curious. Walker's pond is one of the best alewive fish pastures in the county.

98. *Bucksport.*—It is an established saying, that "Bucksport is 18 miles from everywhere," which saying has given birth to the following story:

Stranger. How far is it from Bucksport to Belfast?

Citizen. Eighteen miles.

Stranger. How far is it to Castine?

Citizen. Eighteen miles.

Stranger. How far is it to Bangor?

Citizen. Eighteen miles.

Stranger. Well, how far is it to Ellsworth?

Citizen. Eighteen miles.

Stranger. (With emphasis) Tell me how far it is from Bucksport to h–ll?

Citizen. Not acquainted on *that* road, don't know.

This is a live town. It has a railroad, and the energy and enterprise of Bucksport built it. The East Maine Conference Seminary, an institution of learning having a high standard, is located here. Bucksport and Orland are the only trading posts in the county where farm produce can be sold for cash. The farmers of Bucksport, with their lines of steam communication, should invest in a cheese factory, corn canning, and cucumber pickling establishments. Can their farmers' club do a better work than to take hold of this matter?

99. *Cranberry Isles.*—This town is situated some three miles off Mt. Desert, and thirty-five miles from Ellsworth. The agricultural features of those islands constitute no exception to those of most of the outer isles. The occupation of the inhabitants, as well as the substantial arrangements of their tables, are furnished from the mute being world.

In response to our circular, Col. Hadlock says: "We have thirty-eight establishments for smoking and curing fish; some grade Shorthorns and Ayrshire cattle; Oxford and Southdown sheep; some apple trees, mostly the Gravenstein and Duchess of Oldenburg. Some of our soil is nice for potatoes. Our men folks are all, or nearly so, engaged in seafaring pursuits.

100. *Castine*, 30 miles from Ellsworth and 36 miles from Bangor, has one saw-mill, one grist-mill; and a brickyard in which, last season, were made three millions of bricks—it has clay, water and sand in close proximity. Adjoining tide water, accessible at all seasons, are two canning factories; these establishments, last year, put up 50,000 cans of lobsters, and 15,000 cans of clams. It has a rope-walk, and a cod and mackerel line factory, doing a business of $20,000 annually.

There is an orchard in town, planted in 1784, which bears good fruit. It has but very little waste land. It has an excellent wheat soil, and is equally as good for orcharding. It has one of the few winter harbors, with water bold and deep. As a summer resort it is unsurpassed, and to be known is to be appreciated. Dr. Stevens (whose many kind and generous acts to the sick and to the poor will never be forgotten), in a letter to me, says: "No minerals of value, except slate on Holbrook's island. Soil founded on argillaceous slate, a continuation of the geological formation of the Upper Penobscot, terminating on the east at Buck's Harbor in Brooksville." George H. Emerson, at North Castine, although "driven to death" with business, has found time to make an old, worn out field, with a rocky, sour soil, produce two crops of hay per year; this has been accomplished by underdraining and top-dressing. The top-dressing is mainly a compost of rock-weed and earth, decomposed, and then spread; the effect is wonderful.

101. *Dedham*.—The "Lake House," or Stage House, is 15 miles from Ellsworth, and 11 miles from Bangor. Only geographically, is Dedham a part of the county. Its water-power is second in "head," or supply, to but few in the State. Besides a full quota of lumber mills, it has a large tannery,

which grinds some 800 cords of hemlock bark, and turns out yearly about 100 tons of sole-leather.

The whole town is an aggregation of abrupt metamorphic granite hills. Between its "alpine" peaks are some excellent farms, and our best orchards. Fitz's pond, having an area of three square miles, has been stocked with black bass.

Nestled down among the hills is a miniature village, known as the "Colony," having a moral and an intellectual *flora* and *fauna* of high order, with a deal of business activity.

Standing in front of "Mann's tavern," and facing Hat Case pond, one has a magnificent view of a crop of boulders which have broken from the parent rock, and started on a tour of dispersion.

The soil of Dedham needs a great deal of stirring to dissolve its insoluble potash, to make it available as plant food. Here are all of the pre-requisites for a corn canning establishment. It would take but a few years for such an enterprise to make the old farms shine.

102. *Deer Isle.*—This maritime and island municipality is 35 miles S. S. W. of Ellsworth. The early settlers who obtained a title to their lands before the township was surveyed, were termed "proprietors," and those who did not secure titles until after the survey, were known as "young settlers."

Formerly, Grand Bank and Bay fishing was the chief business. Since the repeal of the "fishing bounty," its fleet of "long legged bounty catchers," have gone to "Davy Jones' locker," and a class of coasting and coast-wise vessels taken their places.

Nearly one-half of the township is salt water covered. If the people are not *amphibious*, nearly every citizen can "hand, reef and steer" with clever expertness.

At Green's Landing is a granite quarry, which affords a yearly crop of 4,000 tons of rough and cut stone, while on the "Reach" shore is a marble quarry. Roofing slate of good quality has been found on Little Deer Isle. Here, are conclusive evidences of an extinct volcano, which in some of the by-gone years hurled aloft a shower of ashes and scalding lava. Perhaps nowhere in the county is the "transition series" of rocks better characterized than here.

J. H. Parker has invented a machine which, by a new process, tempers and straightens steel, which is commanding the attention of saw and knife-blade manufacturers.

Limestone is undoubtedly the parent rock of Deer Isle; but having been crystallized, together with the mica which it contains, renders it unfit for building purposes, as quick-lime, and gives it a consistence which is best adapted for sculpture and architecture.

103. *Eastbrook* is eighteen miles N. E. of Ellsworth. It has no lawyer, doctor, pauper or grog shop. Its mills are grist, lathe, shingle, clapboard, one each, and two saw mills. The farmers are improving their stock by the introduction of Shorthorn, and Jersey crosses. The sheep are mostly Leicester and Cotswold grades. There are some finely grafted orchards. Among the bearing varieties are the Golden Sweet, Early Harvest, August Sweet, Sweet Bough, High Top Sweet, Red Astrachan, Porter, Gravenstein, Northern Spy, Duchess of Oldenburg, etc.

Here, as in all of the up-river towns, lumbering is the bane of farming. This town is noted for its peat deposits—the coal beds of some future geological period.

Mr. H. N. Butler, an observing farmer, writes me that "in plowing some of the highest hills, the plow frequently turns up a kind of stone, which seems to be composed of small marine shells, firmly imbedded in sand, or in a kind of clay state." This is the only instance in which fossiliferous rocks have been reported. These shells must have existed when the sedimentary rocks were in process of formation under water; if the shells are marine, it was the waters of the sea; if fresh water, a lake or river; if intermediate, an estuary. This is as conclusive as if we had lived in that ancient time, and had witnessed this entombment in the sand.

104. *Eden*, a part of the island of Mt. Desert, is 11 miles S. S. E. of Ellsworth. Here, one must look through other than farmers' eyes, to view the wonders of the "puzzle box" to the geologist, the surface twisted and contorted as if it had been "crumpled up" by some mighty hand. It is a land of curiosities, where naught but a "force Divine" could have created its wild beauty, and sublime natural scenery. The "Gorge," the "Ovens," "Schooner Head," "Pulpit Rock," the "Caverns," are some of its "medals of creation."

The chief employment of the people of Eden now is, and is to be, to cater to the wants of summer tourists. Each season adds to the number of its visitors, especially of that class desiring to get out of the suffocating cities into fresh mental and moral air. It is only a question of time when Eden will have a place in the front rank of fashionable watering places, and will have quadrupled her per capita wealth.

105. *Ellsworth.*—This is the "lone" city of the county; but while the city itself is small, Ellsworth, in the aggregate, is the territorial London of "Down East." The business portion of the town is situated on Union river, around the Falls. The Falls which cover a distance of two miles, or from the Bridge to the Falls Village, have within that two miles a total fall of 85 feet, or 100 feet in 2¼ miles. The "holding capacity" of the lake and pond feeders, is estimated at 5,500,000,000 cubic feet, and the cubic feet of water annually delivered at, and discharged over the falls, at 17,500,000,000. The height of the head of the river, above its mouth, is a little more than 205 feet. Above Falls Village the mean rate of discount is so trifling that the term "slack" water is appropriately applied.

For the manufacturing establishments reported, I am indebted to L. D. Jordan. There are eleven saw mills with nine "gangs"; nine single saw, eight shingle, five box, three clapboard, and one grist mill propelled by water. Number of "up and down" saws 117. Driven by steam, three box mills, one flour, seven planers, one stave, one pail, three moulding, one barrel, one grist, one kit, two door, sash and blind, and one pump and block. The other establishments are four carriage shops, four harness, two sail-lofts, one iron foundry, two tin plate and two cabinet makers. When the raw material for wooden ware is exhausted, and the sawdust and "wrap-stuff" have disappeared, a narrow guage railroad will be added to its enterprises; till then

"We have but faith."

Ellsworth has a large territorial area, which is of but little agricultural value other than as sheep-ranges, and of little value for this purpose, while the dogs are uppermost in the strife. Travelers following the stage road see the face of the country in its worst aspect, as the main thoroughfare of travel passes through a section of metamorphic ledges, "kept steady" by counterpoising erratic blocks, which have been brought hither by some terrific earth storm. We know of no other spot in the county with boulders of grandeur equal to those deposited between Falls Village and the "Craigs." Each boulder declares it nationality, each a fragment of a word in a chapter of the world's history.

The *American*, the only newspaper enterprise in the county, was started in 1853, and from a small beginning, has grown into solid favor. Whether on or off the "battle ground of sparring politicians," may it ever keep active its scissors, brain and pen.

In the Tyler or McGown district is a flourishing Farmers' Club. Mr. Tyler has patented a process to preserve eggs, out of which he expects to make his "pile." Here is a piece of road, where one having a fancy for mud can indulge knee-deep, when the frost is coming out.

106. *Franklin* is 11 miles east of Ellsworth, and 17 miles west of Cherryfield. It has nine lumber mills and two grist mills, a tannery and three granite quarries. W. W. Bragdon says, "not one in town is living exclusively by farming." This is another of our sheep-range towns. The soil is coarse and rocky, but under good cultivation is very productive. The true policy for her farmers is to plow less and graze

more. Cranberry culture has received some attention, and thus far is successful.

The material wealth of this town is in its water power and in its granite. The granite is porphyritic, but splits well, and is handsome when hammered.

It is among the possibilities that George's pond may break its barrier, and in utter disregard of all preference for "sprinkling," *immerse* all in its pathway to the bay.

Franklin has shipped more spars, railroad ties, and ship timber, than any other town of equal size in this or in Washington county. Nearly one-third of the hay is cut on salt marshes; the rafting or booming it in, after it is mown, that is, the raking it by water as the tide flows, is fun for the boys, but "death" to rheumatic old men.

107. *Gouldsborough* is 21 miles S. E. of Ellsworth, on the shore stage line. It is the southeastern town of the county. It has five saw, and two grist-mills, and one lobster canning factory, (one has been burned recently). The mills of that mechanical genius, W. L. Guptill, (driven by a "pint of water") show what an almost incredible amount of shipping material can be made out of a given measure of raw material.

Here we find an infusion of Devon and Merino blood. It must have been a depraved appetite which called for Merino mutton in that section.

The soil is a clay loam, with bluffs of bold granite, with veins of galena, zinc and copper. Here, amid the shell heaps covering acres, and which contain antiquities, such as arrowheads, stone hatchets and chisels, pieces of rude pottery, bones of the moose, the deer, the bear, and those of birds, is a rich field for the antiquarian. Among the bones of birds which have been unearthed, are those of the *Great Auk*, now extinct, which tends to show that an arctic climate once prevailed here. Icelandic chronicles demonstrate that the Skraellings, a people of Esquimaux habits, were at an early period scattered along these shores. But who

> "Slowly shaped with axe of stone,
> The arrow-head from flint and bone,"

must be left to the imagination.

108. *Hancock.*—This T shaped town adjoins Ellsworth on the east. This town has a larger proportion of arable land than any other town in the county. It boasts of but one lumber mill. The farm stock (horned cattle) are Jersey, Shorthorn and Ayrshire crosses. The fields, buildings and surroundings, tell of material prosperity. A very noticeable feature is the absence of that *clutteration* which disfigures so many farm door yards.

Within a decade the people upon the Neck have engaged in Grand Bank fishing, and notwithstanding some heavy losses, this enterprise is paying. In no other town in the county (Orland not excepted), does such a business rivalry exist as here, and out of which so much clean money has been coined.

To the seekers of pleasure, or to those who would spend a season imbibing the exhilarating air of our ocean, we know of no more inviting locality than Crabtree's Neck.

Geologically speaking this is a much younger town than Sullivan. It was evidently formed by the early drainage of the country during the last great geological changes of this region. The course of the glacier markings here range from N. 5° W. to N. 15° E. The "level" of North Hancock suggests the probability of an ancient lake bottom.

109. *Lamoine*, a sea-washed town, 9 miles S. E. of Ellsworth, has nothing *Frenchy* left except its name. Its appointments all indicate a people "well to live." The soil is good, and with its facilities for obtaining marine manure, can easily and cheaply be made to produce big crops of hay; but, says a citizen, "the people fish a little, and coast a little, and put the smallest effort and outlay to farming."

The chief industry is fishing. Hon. Warren King gives the yearly catch of Grand Bank fish at 8,000 quintals, and of Magdalen herring at 100,000 boxes, with a combined market value of $55,000. April, 1876, Lamoine had several vessels on their way to "the Magdalens." As a natural sequence, where fishing is foremost, cattle husbandry is hindermost.

Here, we notice a new style of "biddy," Sicillian hens. What its *cackling* claim may be, other than to "pick and eat," we know not.

Blunt's pond is one of nature's curious things. Its altitude above sea level is 300 feet. The colossal embankment which impounds its thirty acres of area, is so artistically constructed that one instinctively feels that the "mound-builders" have been here. Its peculiar location is a marvel, being upon a height of "loess or bluff formation," which extends in a northerly direction across the county.

Along the coast line extensive deposits of clam shells occur, in which human bones have been found. What bivalve gormandizers "ye" settlers of the olden times were. In this bed of clam shells, a few years since, Capt. A. G. Berry found a brass kettle, an axe, and a stone file. Capt. Berry, who is quite an antiquarian, has in his possession the account book of the first settler, also that of Dr. Payson, and some of the old French deeds as executed by Mrs. Gregorie. From one dated in 1788, we extract the following, preserving its phraseology and spelling:

"We Bartholomy de Gegorie, and Maria T. his wife, in consideration of five Spanish Milled dollars, for divers good causes, us hereunto moving, do sell unto Martin Gillpatrick * * * * a certain tract of land, with all the Estate, Right, Title, Interest, Use, Property, Claim and Demand." * * * * *

Signed by
Bartholomy De Gregoire
Maria Therese de Gregorie nee de law the cadillack.
Acknowledged by Nicholas Holt, *Justus peas.*

We are told by Mr. Hiram Bartlett, that rock weed as a top-dressing for grass should be spread as fast as it is pulled. His fields second his statements. His theory is, that as soon as rock weed in heaps begins to heat and decompose, ammonia is formed, and thrown off and lost. Will sea-shore farmers experiment?

110. *Mariaville* is one of the "up-river" towns, as all the country on Union river above Ellsworth is called. The outlines of this town are neither straight, zigzag, nor crooked. Its shape is as inconvenient as an enemy could wish. The occupied portion is like an Indian mile, "all long and no wide."

Upon the outlet of Flood's pond are several mills and a large tannery. Here are some good farms, with tastily arranged farm buildings, as one would expect on the Kennebec. In no part of "ancient Acadia," can better orchard soil be found. The most serious drawback is the cost of the roads and bridges. Every highway surveyor must be a bridge builder. Why not ask aid of the County Commissioners?

111. *Mount Desert.*—This "Coaste Hille" town, Champlain's "*L'isle des Monts-deserts,*" has six mills, one grist and five lumber, two of which are run by steam. The annual ice crop is estimated at 1,200 tons. A granite quarry employs some forty men. The shipment of cut stone, E. B. Babson estimates at 3,500 tons. Stock mostly native. None live exclusively by farming. Dr. Grindle says, "not a level field in town." Hay usually sells at a higher rate than elsewhere.

Says Dr. Grindle: "there are a few facts relative to Mt. Desert which are equally true of many parts of Maine. The climate is not suited to high farming. This is not so much owing to our high latitude as to our nearness to the Atlantic. Our mean annual temperature is no lower than other localities in the same latitude, which are good farming localities; but the difference is this, the change from winter to summer is very sudden, and the period of uncertain weather is very short, while our nearness to the ocean makes the change from winter to summer very gradual, and gives us months of weather which are extremely uncertain. This period of irregular alternating of summer and winter days is the ruin of agricultural prosperity."

The future of this town, as of the county, is in its water power, its stone, and its ice. The town of Mt. Desert, as well as the whole island, exhibits the boulder phenomena in a wonderful degree. Here are "lost rocks" of red and blue granite, trap, gneiss, mica schist, clay slate, and fossiliferous sandstones. The greater portion of the so called granite, is protogine (talcose granite). There is considerable sienite (hornblende substituted for mica), in which are veins of magnetic iron, arsenical iron and pyrites.

Green mountain, 1,533 feet high, is the highest peak on the Atlantic coast from Lubec to the Rio Grande; nor from any eminence on the coast can so fine a view be obtained.

112. *Orland*, at the head of Eastern river, is 15 miles west of Ellsworth. It has one grist-mill, six saw-mills, and a woolen factory. The factory, when in full operation, turned out in one season 30,000 yards of repellants, at six cents a yard less than any similar establishment in the State.

The surface confirmation of Orland is peculiar. The hills are conical and precipitous, while the valleys approach the gorge form. Standing upon a picturesque knoll of "modified drift," on the farm of Frank Buck, one has a grand view of the erratic results of one of Nature's tantrums. Before him are the evidences that in time past, the pent up waters which submerged the vast plane above the factory, burst their bounds, and with fearful force cut a new outlet to the sea, formed Eastern river, and made an island of Verona.

A hasty reconnoisance show most of the farms under good cultivation. The farm buildings and the fences don't wear that "don't-care-me-look," which is the harbinger of an *arid* community.

Of the 300 voters, 200 are farmers. Upon most of the farms appear a mowing machine. Frank Buck has some fine Herd Book Ayrshire and Jersey animals. Few agricultural centres in Maine show greater activity than Orland village.

In the eastern part of the town are masses of potash feldspar granite rocks, which are crumbling into rock meal; in the "meal" gold is found. These boulders are of a porphyric variety, with black mica. In most of the streams occur bright yellow scales of mica, which have given birth to many "gold" reports.

On the northeast side of Great Mountain is a cave which has been explored for sixty feet. It has several rooms with walls and ceiling of basaltic finish.

We suggest that the mountains of Orland belong to the Mountain Limestone period, that age of the growing continent when the crinoed "beads of St. Cuthbert" were made.

113. *Otis* is "up river," 15 miles north of Ellsworth. Soil, as a whole, is productive, when cultivated. At present the good citizens see a "bow of promise" in lumbering, instead of in farming.

Entering the town from Mariaville, one cannot fail to notice a peculiarity in the underlaying rock. The strata are placed perpendicularly, and are composed of alternate layers, a few inches thick, of a hard slate (talcose) and a kind of sandstone. The prevailing rock is mica schist interstratified with impure limestone.

Beech Hill settlement, heretofore known as "New Trenton," can boast of more *cousins* than all the rest of the "realm."

In the northerly part of the town, about the outlets of Flood's and Spring ponds, the surface is level, which requires muscle and will only to make the soil teem with wealth.

Mr. Charles Otis says, "there is a cave on Oak Hill, on the west side of Beech Hill pond, which is twelve feet under ground, with rooms seven feet by ten feet. Ice and snow having been found in it on the 4th of July, gave it the name of the 'Cold Cellar.' The western half of Otis is unsettled, and many good acres are in want of good hands."

114. *Penobscot.*—We are indebted to Jos. M. Hutchins for an elaborate paper, from which we quote the following facts:

"Lumber mills, five; grist mills, two; brickyards, four; mitten manufactory, one; this employs 300 knitters, and yields a yearly product of $12,000.

With the engrafting of new industries, this old town has renewed its age. The larger number of the names of the citizens suggest a Scottish ancestry, while a very large number of men have a wide celebrity for their physical strength.

The Fall Dandelion, *Leontodon autumnate*, which now has *dandelioned* the whole county, we first saw, in 1837, at the Hardscrabble end of the 'Doshen Shore.'

We find some excellent stock here; particularly noticeable are some high grade Shorthorns of Mr. Norton's. For some unexplained cause, the apple trees are many of them non-bearers and short-lived. Hen-hawks are unwelcome summer visitors."

Mr. Hutchins adds, "I have a ledge on my farm, which has excited the curiosity of speculatists, and given rise to a great diversity of opinions among persons not well versed in mineralogy. It exists in layers, is of a slate color; when mixed with linseed oil or white lead, makes a durable paint which defies the action of the elements. It has been used in patent roofing in lieu of slate, and we are told it works well as cement. It seems to combine to some extent the properties of lead and slate, and, in fact, appears to be one of Nature's anomalies, which, on account of its singular combination of properties, places it in neutral position among her valuable productions."

115. *Sedgwick*, 24 miles westerly of Ellsworth, is another of our misshapen towns. The "pompet" which darkens its agriculture, is its maritime facility. A large proportion of this town is non-arable, or grazing land, the bushy acres of which should be made to turn out annually tons of superior mutton. From Sargentsville to Sedgwick, following the shore of Eggmoggin Reach, the soil is easy of cultivation and is quite productive. Like most of our sea-board towns, the sea and not the soil, furnishes the bread. The industrial establishments are mainly those which are related to the fishing industry.

At Sargentsville, Hon. W. G. Sargent & Son are doing a flourishing business. At the village are some very pretty red Durhams, introduced by Joshua Watson. When the shore-line becomes a summer resort, as it must, the growing of "garden truck" will become a paying pursuit. The central position of Sedgwick is of but little agricultural value. A few squatters have squat in, and there they *stay* to see others live.

A cheese factory, and cucumber growing for pickles, are the more pressing needs of Sedgwick's farmers. This town has taken heed to its future, in "building upon a rock," being underlaid with granite.

116. *Surry*, on the west bank of Union River bay, has a large comparative area of good tillage land. The most of the surface soil is so intermixed with comminuted quartz, or silicious sand, that cranberries grow in the grass fields. The cultivation of this staple crop is attracting more and more attention. The town, in 1872, constructed fish ways to Patten's ponds, and this season will stock the ponds with alewives and salmon. Here, are two flourishing Farmer's Clubs. The hard times have driven the farmers to the muscle-bed. Bless the hard times for that.

A recent discovery of quartz, which if in quantity, and as pure as the specimens, is valuable for glass-making or porcelain ware.

On the "Toddy" pond road occurs what Prof. Gunning calls a "strange behavior of granite," similar to, but not on so grand a scale as in Orland.

"Over miles of surface there lay, a few years ago, a bleak profusion of granite boulders. To-day these boulders are seen in every stage of ruin. Here and there is a mound of gravel, all that remains of a once great boulder, while here and there is a boulder just smitten with decay. We have found the decay not a chemical rot, but a mechanical disintegration. The granite was badly made, and the fate which awaits all dishonesty has at last overtaken these boulders.

But the mystery is that these rocks should have stood there so many thousand years—perhaps 200,000 (since the Glacial Period)—all firm and sound, and then, all at once, about twenty years ago, taken it into their old flinty heads to tumble down into gravel!"

If the tourist will drive on a few miles beyond this "world rot," into the Dedham stage road, he can see the most wonderful display of boulders on the continent. Immense boulders lie in wild confusion, boulder on boulder,

"The fragments of an earlier world."

117. *Sullivan*, established on a rock, is 13 miles S. E. of Ellsworth. It has long been noted for its immense deposits of granite or sienite, and for the first-class coasters constructed in its ship yards, as well.

The chief industry of the town centres in its inexhaustible beds of granite, and such is the growing demand for "building stone," that long before the next centennial, quarrying will subordinate to itself all the other industries of the place, and will become the sole article of export. The granite, which contains veins of beautiful feldspar green, is of superior quality, splits well, may be wrought into almost any shape, and is suitable for any kind of building.

At Waukeag Neck, and at East Sullivan, are good farming lands, and some good farms, which, with the promise of a home market at the quarries, can be worked with profit. Every man who is not a stone-cutter should be a keeper of sheep, for the finger of Nature has here written "graze, and not plow."

Bridging the "Falls," a future, if not a present need, is not a matter of doubt, but of time only; for the history of progress shows that individual and municipal rights always succumb to public demands.

118. *Trenton.*—This peninsula abuts Ellsworth on the south; extends to and includes Mt. Desert Narrows. Farming here, as in the other of our sea-washed towns, is a secondary vocation. The soil, and the "lay of the land" on the western slope of Jordan's river, closely resembles that of the upper St. John's. Some of the best farms are without roadside fences.

Monroe Young, the Mayor of Ellsworth, has a paradise of a farm. It will well repay one to visit this farm, just before haying, to see what muscle-bed will do for an old, worn-out grass field, and how money can be made by farming. But few farms can be found in the county, or in the State, with fewer dead weights to endanger the "just poise of the beam." H. S. Trevett, a reading farmer, and who does not go in for paper covers, says, "we have several who live exclusively by farming."

At Oak Point are evidences of a settlement anterior to historic data. Trenton occupies a central position, very nearly within the great mica schist basin of the county, and lithologically considered, is not within the true coal or lime formation. This basin is supposed to be of Cambrian age.

A well located cheese factory would soon double the value of the grass and grazing lands of Trenton, while the growing of potatoes for shipment can be made a good paying business.

119. *Tremont.*—This "tri-mountain portion of the Desert Isles," is situated 25 miles south of Ellsworth. Like most of our maritime towns, its "staff of life" is found in the salt sea. In the early settlement of the island, Bass Harbor was a favorite resort of bass. Dog mountain has been carefully prospected, with spade and pick, for money hid by Captain Kidd. The eastern side of the "Lovers' Scalp" mountain has an almost perpendicular descent of 900 feet to the surface of Somes' Sound. The sea-wall at South West Harbor, which, after an off the coast storm is often 15 feet high, is one of the most interesting of those peculiar embankments found along the coast.

Among the not to be coveted municipal appendages of Tremont, is its *guild of indigents*, upon Lunt's Long Island, a fruitful field whereupon the overseers of the poor can "shine good deeds in a naughty world."

120. *Verona.*—This "mountain in the sea," is situated just below Bucksport, and between Penobscot and Eastern rivers. The soil is hard and rocky. The chief industry is weir-fishing, and during the "run of the salmon" there is but little of sleep or slumber for the nocturnal weir-men.

Says Hon. A. H. Whitmore, "we have no thoroughbred stock. For sheep, our island affords an excellent range. Within a few years a number of apple orchards have been planted, mostly New York trees, and are doing well. The varieties, mainly, are Red Astrachan, Duchess of Oldenburg, and Talman's Sweet."

This, the earliest settled locality on the Penobscot above Belfast, and known for more than fifty years as Whitmore's, or as Orphan Island, has grown and shipped more cords of hard wood per acre than any other town in the county.

121. *Waltham*, on the eastern bank of Union river, is 11 miles from Ellsworth. It has a natural apple orchard soil, and a soil peculiarly fitted for potatoes. For orcharding, no locality in the county excels that of "Timber Brook Ridge."

Here is another of those interesting caves. Three of its rooms have been explored, the larger of the three being 15 feet by 20. "Cave Hill" is without doubt out of the same family as the mountains in Orland, and of the same geological age and formation.

The northeastern portion of Waltham is a confusion of gigantic boulders. Marine shells, and petrified forms of plants and animals, are frequently turned up by the plow. Not many centuries gone by, the pretty village flat, at Hasting's bridge, was a lake bottom. The evidences are legibly written there.

Webb's brook is one of the very best of "up river" cheese factory sites, which the farmers of that vicinity cannot afford to let longer go unimproved.

122. The "SEPARATION."—On the fourth Monday of July, 1819, the inhabitants of the District of Maine voted to become an independent State. It was enacted by Massachusetts, that not less than a majority vote of 1,500 would be deemed as an expression in favor of separation.

The whole number of votes was	4,709
For separation	3,315
Against separation	1,394

The whole number of votes in Hancock County was 1,518.

For separation	820
Against separation	761

From Sullivan and Mariaville plantation no returns were made. Castine, Brooksville and Sedgwick, each gave a major vote against separation.

In the Convention which convened at Portland, Oct. 11th, 1819, to frame a Constitution, Hancock county was represented as follows:

Deer Isle, by Ignatus Haskell and Asa Green.
Bluehill, by Andrew Witham.
Trenton, by Peter Haynes.
Sullivan, by George Hinman.
Gouldsborough, by Samuel Davis.
Bucksport, by Samuel Little.
Eden, by Nicholas Thomas, Jr.
Orland, by Horatio Mason.
Ellsworth, by Mark Shepard.
Castine, by William Abbott.
Surry, by Leonard Jarvis.

There being defects in the returns from Ellsworth, Orland and Gouldsborough, the delegates therefrom were admitted by a resolve only.

Of the several Committees, the county was represented as follows:

"On Style and Title of the New State," Abbott of Castine.
"To make application to Congress," Jarvis of Surry.

The votes given by the towns now embraced within the county, for or against the Constitution, submitted by the Convention, were

Bluehill,	Yes, 9,	No, 37.
Brooksville,	" 29,	" 11.
Castine,	" 29,	" 4.
Deer Isle,	" 22,	" 1.
Ellsworth,	" 24,	" 1.
Gouldsborough,	" 14,	" 00.
Orland,	" 22,	" 00.
Penobscot,	" 32,	" 00.
Sedgwick,	" 23,	" 24.
Sullivan,	" 29,	" 1.
Surry,	" 30,	" 00.

The returns from Eden and from Trenton were received too late, and were rejected; those from Bucksport omitted to give the vote.

The first officers of Hancock County were: Judges of Common Pleas Court, Paul D. Sargent of Sullivan, Oliver Parker of Penobscot; Sheriff, Richard Hunnewell; Register of Deeds, William Webber; Judge of Probate, Paul D. Sargent; Register of Probate, Jonathan Eddy, Penobscot.

In 1790, the county was divided into two commercial districts, known as the Penobscot and the Frenchman's Bay Districts. John Lee was appointed Collector for the first, and Meltiah Jordan for the second. Deer Isle and Bluehill were made ports of delivery.

If the survey which I now submit, shall have the tendency to give a swifter growth to any industry of the county, I shall not have written in vain. How far its statistics and suggestions may aid in accomplishing this desirable end, I leave to the public and the future to decide.

MISCELLANEOUS PAPERS.

A PLEA FOR VETERINARY SURGERY.

By Prof. J. Law, F. R. C. V. S.

We have seen that in the days of Hippocrates, medicine was to a large extent one, the physician was, in many cases, a veterinarian as well, and took lessons in anatomy, physiology, pathology, and therapeutics from his practice on the lower animals. For many, this catholicity of feeling and action produced a breadth of view and soundness of practice which has served to rescue their names from oblivion, and hand them down to us as the *fathers of medicine*.

In modern times a similar course has secured most of the great advances in medicine and surgery, and physiology and therapeutics. If we open a modern work on physiology, we see that almost every step in advance has been gained from observation made on the lower animals. To illustrate this would be to furnish a large volume. Our knowledge of the functions of the nervous system, of circulation, of sanguification, of absorption, of nutrition, of secretion, etc., is almost entirely due to observations made on the lower animals. As medicine has advanced, this investigation of the lower creation has been resorted to more and more, and can be traced down from the labors of Harvey, of Haller, of Legallois, of Charles Bell, of the Hunters, of Flourens, and of Majendie, to the great host that are now engrossed in this profitable field of study.

If we pass to pathology the case is nearly the same. Many of the most complex pathological processes owe the elucidation of their nature, progress and results, to observations made on animals. The phenomena of inflammation as a generic, morbid process, have been studied on animals in a way in which it would have been impossible to do on man, and the descriptions given of inflammation and its products, are descriptions drawn from animal pathology. Fever, too, presents facilities for study in animals, which could not be obtained in the human subject, and these have been availed of to elucidate points that would have otherwise remained in obscurity. (See as a single illustration of this, the English Royal Commissioner's Third Report on the Cattle Plague.) The service rendered in regard to the other morbid processes is well illustrated by the treasures of the Hunterian museum, and by the works of pathologists from Hunter's day to this.

In surgery an analogous obligation has been incurred. Plastic operations, the methods of repair in fractures, tenotomy, hæmostatics, subperiosted section, and a host of other brilliant advances in modern surgery, were based upon observations made upon animals. Some, indeed, like tenotomy, were first practiced by veterinarians on domestic animals, and afterward appropriated for the relief of man.

When we enter on the list of contagious and parasitic diseases, we are at once brought face to face with a sanitary question of supreme importance alike to man and to his living possessions. Several of the specific and contagious diseases of animals are communicable to man, with a more or less deadly effect. Many, also, of the parasites of animals inhabit the human body as well, and the result of their entertainment is not unfrequently fatal to the human bearer. As both the contagious and parasitic diseases are propagated by germs produced in countless numbers in the body of the victim, it follows that the aggregation in a limited area of men and animals, in which they can live and increase enormously, enhances the danger to both kinds of victims. If physicians are left ignorant of the affection in the beast, and veterinarians of the same in man, they each miss the golden link which would reveal the true nature and dangers of the disease, and enable them to contend with it successfully.

SPECIFIC DISEASES COMMON TO MAN AND ANIMALS.

Without entering extensively upon the subject, I will note a few of the more fatal diseases in which men and animals reciprocate:

Asiatic Cholera.—The implication of domestic and wild animals in this disease, has been extensively observed: In India, by Annisley, Tytler, Jamison, Searle, Chalmers, Rankin, Orton, Barrand, and others, and in Europe by Jænichen, Kleinert, Cohen, Hensinger, Carrere, Hildebrand, Hering and Dick. Recently, Thiersch, Burdon, Sanderson, Crocq, and others, have investigated the disease, producing it experimentally in a great number of mice, guinea pigs, hedgehogs, pigeons and dogs. These experiments on the lower animals have served to clear up the nature of the disease, and to suggest a rational treatment, and above all, a sound system of prevention which no observation of the malady in the human subject alone could have furnished. The physician who neglects such light, and confines his observations to the human patient, is an unsafe guide, whether in the sick room or as a sanitarian.

Hydrophobia — Canine Madness. — Everybody thinks he can recognize a mad dog, and many a poor brute, the victim of an epileptic fit, of a bone in the throat, or even a violent colic, has been hurried out of existence, under the conviction that he is rabid. Even among the medical profession, we find the most injurious blunders on the subject. How often do we read accounts of *hydrophobia* in man as the result of a bite from a dog which is known to be still alive and well. Two weeks ago I was asked to visit a case of this kind, in a boy of eleven years, who was suffering from paroxysms recurring every half hour or three quarters, and of whom it had been decided by physicians that he could not live over twenty-four hours more. One of the paroxysms had just terminated on my arrival, but I found no febrile temperature, no visual irregularity, and no mental susceptibility, such as characterize hydrophobia. His pulse was natural as regards number, but irregular alike in force and frequency, and altogether it was evident that he was a very nervous, excitable subject, and the victim of one of those emotional forms of disease so well illustrated by the dancing mania, etc., of the middle ages. During the next three hours, in which the boy's attention was engaged and kept from reverting to his infirmity, there was no return of the paroxysms, and after this, (ten P. M.,) he went quietly to sleep. An enthusiastic student spent each day with the boy for a week, after which the little fellow returned to school happy and well. Many such cases might be described with a less favorable ending, and of which the brains and other structures have been subjected to microscopical examination, as illustrative of hydrophobia. Nor are mistakes on this subject confined to the rank and file of the medical profession. The learned Sir Thomas Watson, in his recent article on this malady, records his belief that "hydrophobia does not ever produce itself." This is a time honored fallacy, but now abundantly disproved by accidental inoculations of those that attend on the victims and wash their clothing, as well as by the inoculation of animals with the saliva of rabid men. The dangers of such blunders and fallacies are too obvious to require comment.

Glanders.—Though known in solipeds as early as the times of the ancient Greeks and Romans, this disease was only observed in man in the beginning of the present century. Then it was first recognized by Waldinger, of Vienna, and as attention was attracted to the subject, his discovery was soon amply confirmed from every side. What frightful sufferings and horrible deaths had resulted, at all times and in every part of the civilized world, before the discovery that man owed this disease to the domestic animals, can never be revealed, but from the number of cases reported on all sides, as soon as Waldinger's discovery became generally known, a very high mortality can be safely inferred. Here again we have a terrible example of the loss sustained by the disassociation of human and veterinary medicine. The criminal negligence of our State Legislatures to enact laws forbidding the use or exposure of animals suffering from this and other fatal disorders, contagious to man, may be in part charged on the apathy of the medical profession on the subject. The natural result has followed; many of our large cities swarm with glandered horses, which are habitually sent to the country for treatment or change of air, and severe losses are entailed in many localities. What is more to our present purpose, human victims are not unknown, one such having just come from under my notice, because the attending physicians honestly acknowledged that they knew little or nothing of the malady.

Tuberculosis.—Modern research, mainly in the hands of veterinarians, has established the fact that tubercular consumption is a specific and communicable disease, conveyable from animal to animal not alone by inoculation, but by feeding upon the fresh and even cooked products of the disease. Here again is a subject which has proved a battle-field for centuries for the medical men, has been definitely settled by a reference to comparative pathology, and by instituting a series of observations and experiments on the domestic animals. The importance of this discovery of the communicability of tubercle to animals and man, cannot be over-estimated, and speaks with trumpet tongue of the value of comparative pathology to the physician and veterinarian.

PARASITIC DISEASES IN WHICH MEN AND ANIMALS RECIPROCATE.

Diseases due to parasites, harbored by man and animals, are far more numerous than those dependent on specific disease poisons. We cannot here enumerate the whole, but must hastily refer to a few only of the more redoubtable.

Malignant Pustule, Malignant Anthrax, Anthrax Mycosis, Aathrax Baccihis.—This is one of the most anciently known of diseases, being almost certainly that which cut off the

Egyptians and their cattle in the days of Moses, and that which swept down the Greeks and their live stock at the siege of Troy. Through the middle ages its ravages were frequent and extensive, the destruction falling with equal impartiality on man and beast. In the agriculturally undeveloped steppes of Eastern Europe and Asia, such wholesale destruction occurs as a matter of to-day, and in our own Southern States severe losses are often sustained. Even in the North it is far from uncommon. I have known as many as fifty perish from a single herd in two weeks. Doctor Bell records the occurrence of the disease in an equal number of human beings, within a few years, and many of them in Brooklyn City Hospital. I am further acquainted with a number of isolated attacks in man, caused by inoculation from the diseased animal. Here, again, in several cases, the attending physicians failed to recognize the disease, on account of their want of acquaintance with the pathology of animals. We now know, from investigations conducted on animals, that this affection depends on the presence in the system of a vegetable parasite, a special development of a fungus (Bacillus Anthracis), which maintains its infecting properties only at a particular stage of development, but may be preserved for an indefinite length of time in buildings, yards, fodders, soil, and grasses, as well as in the dead bodies and other products of the deceased animals.

Milk Sickness.—According to Dr. Phillips, this disease is also due to vegetable fungus, which conveyed to man, in the products of the living or dead animals, produces a profound nervous prostration, with impairment or suspension of nearly all of the vital functions, and in many cases death. As the disease is produced in man mainly by the consumption of butter and cheese, and as these products from infected localities are likely to be sent to a distance, it seems probable that cases of milk sickness occur, especially in the large cities, without any recognition of its true nature. A thorough course in comparative pathology would enable the physician to recognize these more readily, and to interdict such dangerous articles of food, through the agency of the city boards of health.

Vegetable Parasites on the Surface.—Of other vegetable parasites there need only be mentioned those productive of the different forms of ringworm, all of which exist in the domestic animals, and those causing thrush in the mouth of young animals. If the practitioner, medical or veterinary, is unacquainted with the habits of these parasites on animals and vegetables, he is not likely to prove a satisfactory sanitary adviser, however successful he may be in destroying the parasite in the individual case.

Entozoa.—Of entozoa, or worms, man reciprocates with the domestic animals in entertaining at least six different species of *tape-worms*, some of them like *echinococcus*, productive of much suffering, and a fatal result in many cases; of one *trunatode* or *fluke*, and of three *round worms*, including the deadly *trichina*.

Epizoa.—Of animals that live on the surface, no less than a dozen species are common to man and the domestic animals, and though these are not usually dangerous to life, yet they will, in some instances, prove most inveterate and indestructible, and condemn their victim to a most miserable existence.

This hurried and imperfect notice of the maladies common to man and animals will serve to illustrate how much is lost by the separation of the two fields of medicine, human and comparative. If the above remarks have seemed to reflect unduly on the average medical practitioner, it is in no invidious spirit, but only because the object of the present paper is to show how much the medical profession may gain from a closer association with comparative pathology, and especially with veterinary medicine. Such a connection would accrue even more to the profit of the veterinarian, alike in giving him the status that he ought to possess, and in furnishing him more thoroughly for the practice of his profession. The average veterinarian is, to say the least, no better informed on many of the points referred to than is the average physician, and broader views and sounder practice will come to both from the mutual cultivation of that field which is common to both. This is already recognized in the best medical schools of Continental Europe, and by their chairs of comparative pathology, filled by accomplished veterinarians, they are seeking to reap the advantage. England has recognized the same truth in associating with the Brown Institution—an endowed hospital for sick animals—a department for experimental research in comparative pathology, and a lectureship on the same subject. Oxford now follows suit, in an endeavor to establish within her academic shades a chair of comparative pathology.

If we turn from physiology to the pathological action of medicines, the basis of all rational therapeutics, we find that here, too, a solid groundwork is laid in a careful observation and experimentation on animals. Take up any large work on therapeutics, and you find that nearly every drug has been thoroughly tested on the lower animals, and that its various known physiological effects have each been determined by such experiment.

Doctor Bell Pettigrew puts the case forcibly but thoughtfully, when he says: "No one can intelligently administer medicine to a human patient who is ignorant of the effects produced by it on the lower animals. A perfectly educated physician should also be master of the veterinary art."

Another eminent medical writer remarks: "That men should confine themselves to curing what they are pleased to call the lower animals to the exclusion of mankind, and the reverse, I cannot, and never have been able to understand; and I hope the day will soon come, when he who medically treats mankind, may be looked upon as a dangerous specialist if he has not attained his position by a comprehensive study of the lower animals. That the sister study of human medicine should recognizė the advantage of a knowledge of comparative anatomy and physiology, and overlook the vast and unspeakable advantage of a knowledge of comparative pathology is really inconceivable."

The London *Medical Examiner*, in announcing a department of *comparative pathology* in its columns, makes the following very true remarks: "As much of our exact knowledge of the phenomena of healthy life, or physiology, has been obtained by observation on the lower animals, true scientific pathology, or a knowledge of the phenomena of disease, must be based upon the study of diseases and morbid processes occurring in other animals besides man. It is a recognition of this fact, that has led to the proposed establishment of a chair of general and comparative pathology at Oxford, a university which has been foremost in promoting the science of biology. There are many reasons why animal pathology and medicine should precede or accompany the study of human medicine. Living under more simple conditions—conditions more approaching those of nature—the transition from a state of health to a state of disease is more easily traced, and diseased processes are more simple in the lower animals than man. The student of animal pathology and medicine is able to command the circumstances of diseases to an extent quite unparalleled in the case of man. Both the individual and his environment are to a greater extent under the control of the observer, and by varying the condition of life he is able to modify the course of the disease. There is thus afforded to him an opportunity of calling into play, of varying or of removing the conditions which appear to produce disease, and thus to determine the essential factors of morbid processes. In the human subject one of our greatest difficulties is, that conditions cannot be repeated or varied at will, and thus arises the uncertainty which hedges in the study of medicine, however indefatigable and sincere may be the student. Again, in the lower animals morbid processes can be studied in all stages of their progress, for the victim of disease can at any moment be destroyed. In this way essential and early changes can be differentiated from those which are secondary and mere complications. It is the privilege of our office to prolong human life to the utmost limit, and hence we are unable to employ the scalpel and the microscope, or the test tube to the dead body, till such time as the original morbid processes have become greatly obscured, if not completely effaced. Such knowledge is necessarily one-sided; for by studies prosecuted on the dead, we are often unable to discover the subtle and delicate point on which is suspended the brain, oscillating between recovery and death. It is in the domain of primitive medicine, however, that we have most to expect from veterinary medicines. Here the scientist is not only able to indicate the measures necessary for the suppression of disease, but can get legislative authority for enforcing them. From knowledge gained in this department, we shall be able to apply the remedies necessary for the prevention of human diseases."

"Many of the greatest achievements in physiology, pathology, and therapeutics have been gained in the sphere of the veterinary physician by students and practitioners of human medicine. The more advanced position of human medical science explained this anomaly in former times. But now veterinary medicine has emerged from the empirical to the scientific stage; and the veterinary profession will be expected to contribute more and more to the knowledge of our science and art. The training of the veterinary practitioner is daily becoming more comprehensive and more careful, and the fruits of this are seen in the rapid advances of veterinary science, and in the culture of those engaged in veterinary medicine and surgery. Veterinary literature has made enormous progress during the last few years, and the most brilliant future may be predicted for it. Now that veterinary medicine has been established on a scientific basis, the time has come when the bonds that unite the students and practitioners of human and veterinary medicine should be knit more closely, and the two branches be brought into more intimate relationship. Human and veterinary medicine are progressing along the path of knowledge, but they are separated from one another. Fellow-travelers along the steep and rugged course, they should advance hand in hand, helping each other to surmount the obstacles they will have to encounter on the way. Each has much to learn of the other. While the objective side of disease is often studied to the greatest advantage in animals, the subjective can be studied in man alone. It is, therefore, no less necessary for the veterinary physician to have a knowledge of disease in man, than it is advantageous for the practitioner of human medicine to study diseased processes in the lower animals."

This last remark is suggestive of the true remedy for the present undesirable state of things. Both branches of medicine suffer from separation. Each is necessary to the rapid progress and highest advancement of the other. The obvious necessity is, that both should be taught in the same institution. While this will secure breadth, fullness, and soundness in the instruction, it will attain still another desirable end—the teaching of both at a cheaper rate. Much of the ground gone over by the student of human medicine must also be covered by that of veterinary medicine. Many subjects may, therefore, be taught to a large mixed class of students of those two branches, thereby saving the time and expense of two teachers, while the increased numbers and greater resources will enable the institution to make this one course much more effective than any two such courses, delivered by different men, in distinct colleges, and with less perfect appliances. It is only when the medical and veterinary students enter on the study of those subjects which are peculiar to the practice of the two branches of medicine and surgery, that they must study in distinct classes and under special teachers.

Before leaving this subject, one other remark on the words of the *Medical Examiner* is demanded. The full advantage to the medical profession from association with the veterinary, is only to be obtained by the experimental investigation of disease. In practice, the veterinarian has rarely any advantage over the physician of man, in the power of sacrificing the sick in the interests of science or of changing the environment and conditions of life. To avail of this, provision must be made for a certain expenditure for experimental purposes, and any such outlay with competent scientific supervision, must prove of the greatest advantage to both physician and veterinarian.

ADVANTAGES OF THE DOUBLE QUALIFICATION (MEDICAL AND VETERINARY) TO COUNTRY PRACTITIONERS AND THEIR PATIENTS.

The association of human and veterinary medicine in one educational establishment would render it easy for young men looking forward to a country practice to extend their curriculum, so as to secure degrees as "human" and "animal" physicians. The double practice would, in many cases, add largely to their emoluments as well as their usefulness; their employers would esteem them all the more highly that they could turn to them with confidence to prescribe for their valuable stock, as well as their sons and daughters, while to the physicians themselves would belong the enviable distinction of conservators of the lives and fortunes of the community. In many districts where two professional men, medical and veterinary, could scarcely subsist, one with the combined qualification would make a good livelihood. If properly educated, he would prove a sounder guardian of human health, from his acquaintance with the diseases of the dependent animals, and he would be a safer veterinary physician for his extensive acquaintance with the pathology of man. His better position and more abundant resources would enable him to keep up with the times, and to avail for his employers of the most recent advances in pathology, therapeutics and sanitative, so that the dweller in the remote country districts could have nearly all the advantages of the denizens of the city. Finally, the practitioner would have the uncommon advantage of a most extended field of observation, and not only would he be enabled to add many new facts to pathology, but he might gain a breadth and soundness of erudition, that would in some cases especially fit him to be a teacher of the science.

In advancing such a proposition as the above, I by no means advocate that the simple physician should encroach on the sphere of the veterinarian, or the veterinarian on that of the physician. It is a matter of common observation with veterinarians, that when a physician prescribes for his own horse, he is as likely as not to blister the shoulder for a lameness due to disease in the foot, or to give a few grains of tarter emetic, which would be entirely inoperative on the equine system. So with the veterinarian, in prescribing for his own family, he is stepping out of his sphere, and is likely to act detrimentally, rather than beneficially. For this new field, I propose a new style of practitioner, more comprehensively educated and equipped than either physician or veterinarian—one who has given a longer time to acquire his education, who has earned both degrees by faithful and conscientious study, and who, in the hospitals for men and animals, has made himself thoroughly acquainted with the diagnosis and treatment of the maladies of man and beast. In many sparsely populated districts, a practitioner of this kind would be a most desirable acquisition, while in the cities and densely peopled localities, specialists must continue to pursue human and veterinary medicine, surgery, ophthalmology, otology, gynæcology, dentistry, &c., &c.

VETERINARY PRACTITIONERS NEEDED IN THE UNITED STATES.

There is no means of ascertaining the number of educated veterinarians in the United States, but it may safely be affirmed that nearly all such are confined to the large cities. In the country districts, where the greatest and the most valuable part of our live stock is to be found, they are few and far between. In the absence of these data, we may estimate the number of live stock of our own and other countries, and deduce from this the requisite number of veterinarians. Great Britain, which stands low in the European scale, as regards veterinarians, owns over forty-two millions head of live stock; and not much less than two thousand veterinarians. If, however, we cut off sheep and swine, for which the English veterinarian does little or nothing, we find but three millions nine hundred thousand head of horses and cattle, or more than four thousand for every veterinarian in the country. The ratio adopted in the cavalry, of one veterinarian for each regiment of one thousand, would necessitate a four-fold increase of the profession.

Turning to the United States, we find over one hundred million head of live stock, or if we cut off sheep and pigs, we have still left over thirty-nine millions horses and cattle, very nearly five times the number found in Great Britain. If, therefore, Great Britain requires two thousand veterinarians, we require no less than eight thousand, or if we were to estimate according to the number supplied to the British army, we would swell the number to thirty-nine thousand.

The following tabular arrangement will present very forcibly the needs of the United States, as compared with Great Britain:

	United States.	Great Britain.
Horses, asses, and mules - - - -	11,149,800	2,790.851
Cattle - - - - - - -	27,870.700	6,115,491
Total horses and cattle - - - -	39,019,500	8.906,342
Sheep - - - - - - -	35,935,300	31,313.941
Swine - - - - - - - -	25,726,800	2,422.830
Total live stock, (except carnivora) -	100,681,600	42,643,113
Veterinarians, actual, (probably) - -	200	2,000
Veterinarians needed in ratio with live stock,	4,762	
Veterinarians needed in ratio with British cavalry - - - - - - -	39,019	

It is, perhaps, an extravagant estimate, to set our needs down at four thousand seven hundred and sixty-two, or one veterinarian to every twenty thousand head of live stock; though, if these could be collected within a reasonable area, we would find more than enough to do in attending to their health. The objection is not want of practice, but the fact that in many places the stock is scattered over such a wide district that it would not pay the veterinarian to visit them at rates which the interests of the stock-owner could allow. If, however, we could furnish such districts with practitioners having the double qualifications, they could find within a reasonable area a sufficient number of patients to make it worth their while to stay, and worth the people's while to employ them. One such practitioner to every two hundred square miles, is surely a very modest estimate, and this would give us considerably over five thousand in the States of the Atlantic slope.

VALUE OF VETERINARIANS TO THE COUNTRY.

The value of the present services of veterinarians in the United States must be a very meagre sum comparatively to what it might be if veterinary science were availed of as it ought. Some estimate of the value of a scientific veterinary supervision, may be deduced from the fact that prior to 1836, the losses in the French cavalry amounted to one hundred and ninety per one thousand per annum, but the veterinary care has reduced this of late years to sixty-seven per one thousand yearly. In the English cavalry the record is far better, and largely because a superior stable accommodation has been secured. Colonel Sir F. Fitzwygram, himself a veterinarian, in a recent lecture, gave it as the result of his experience, that veterinary sanitary science had reduced the loss of horses in the English cavalry regiments to a minimum, and the annual "casting" of horses to ten per cent.; giving an average service of ten years to each horse carrying two hundred and fifty pounds on its back, at a rapid pace over rough ground. The same authority recently mentioned an instance in which the supervision of a veterinarian led to a yearly saving of $30,000 in a shed of four hundred hard working horses. An instance almost as striking occurred in the practice of a friend of the present writer, in charge of the horses of a large colliery company in Durham, England.

But it is in the department of *sanitary or preventive medicine* that the value of the work of the veterinarian is the highest. Ordinary diseases of animals carry off isolated individuals only, and the full measure of the loss is in every case seen and appreciated at once. One case of sickness or death brings no danger to the other stock, and the owner can, in any case, estimate whether he can better afford to lose his property than to incur expenses for medical treatment. But with animal plagues, the first case of illness is pregnant with a mighty and ever increasing danger, not only to the other stock of the same owner, but to all the live stock of the nation, and even in some cases to the citizens as well. Taught by the bitter experience of many centuries, the separate nations of Europe now avail of veterinary science to save them from yearly losses of millions of dollars by animal contagia. A country like England, which has been beguiled into a false sense of security, by its comparative isolation, and that has failed to avail of this modern science, has been drained of $40,000,000 in one and a half years by one plague, and of a regular tax of upwards of $15,000,000 per annum by another.

Coming to our own land, we find a loss by one plague of swine in a single year, (1876,) of no less than $20,000,000. It is the province of veterinary science, acting with government authority, to attempt the extinction of this plague, and there can be little doubt that at a small expense comparatively, this malady may be crushed in the bud in whatever locality it may show itself. Beside our other indigenous plagues and parasitic diseases in domestic animals, we are continually threatened with foreign animal contagia, against which we have no reasonable protection. The present treasury orders on this subject, admit all "*blooded,*" animals on the strength of a consular certificate of soundness, which is only equivalent to a free invitation to animal diseases in general. The only safe position to occupy in this matter is that of a careful examination of every imported animal by a veterinarian, of a quarantine under veterinary supervision, and of such a duration as will exclude the possibility of the dreaded disease being harbored by the subject, of a thorough disinfection of the surface of the imported beast, and of all articles used about it, and finally of the systematic destruction of all fodder and litter imported with such animal. The limited character of our importations of live stock, would allow of such restrictions without any perceptible injury to commerce, or to our national prosperity; and the ever threatening dangers against which they would secure us, are in their nature almost illimitable as to extent and duration. The most insidious, and therefore the most dangerous of all cattle diseases, (*lung fever,*) we now harbor in our midst, and while it makes slow progress owing to the opposing current of cattle traffic from the west, and the want of temptation to transport our common eastern cows into the cheaper western herds, yet it is steadily encroaching on new territory, and now numbers its victims among several high class herds. Any day a bull from one of these thoroughbred herds may be sent west for the improvement of the native stock, and may thereby introduce this disease into our unfenced stock ranges, when it will be practically impossible to eradicate it. The same malady imported into the open stock-runs in the Cape of Good Hope and Australia, swept the herds off in a rapid destruction, and successfully resisted all efforts to extinguish it. The same holds good with this and other plagues on the open steppes of eastern Europe and central Asia. There, animal plagues in general find a perennial home. From these the best directed efforts of a thoroughly equipped sanitary commission have failed to eradicate them, and against these eastern plagues the adjacent European nations can only protect themselves by a most elaborate and expensive system of frontier inspection and quarantine, which is paralyzed on the occasion of every great war, and occasionally even circumvented by smuggling and corruption, with the most disastrous effects to the western countries.

Our cattle traffic from the west and south is so extensive that any efficient system of examination and quarantine, sufficiently extended to exclude this disease, would be impracticable, as the trade would be thereby completely suspended. Since, therefore, the trade must go on, the inevitable result of the infection of our western stock-runs will be the infection of our eastern States throughout, and a yearly loss which can easily be estimated by the corresponding loss in Great Britain, from the same disease, since its importation, in 1842. Since that time Great Britain has lost in deaths alone, from this malady, on an average, $15,000,000 per annum. This, it will be remembered, is on a stock of six million head, from which fail to be deducted the great herds of black cattle bred in the highlands of Scotland, which have hitherto escaped infection, owing to the absence of the importation of strange beasts into their midst. Taking the same ratio, without this deduction, for our twenty-eight million head of cattle, our general infection would lay us under tribute to the extent of $60,000,000 per annum. Or if our herds increase at their present rate, our losses, by the end of the century, would amount to a yearly total of at least $120,000,000.

This it is the province of veterinary science to save to the country, by crushing out this most insidious and fatal malady, while it is still confined to the enclosed farms of our eastern States. At present this can easily be accomplished by sound and rigidly enforced veterinary sanitary laws. If the United States decline to avail of these, the sad truth of the above mentioned representations will burst upon them with overwhelming force on some, perhaps, not distant day, and they will vainly turn for help to the long neglected science of veterinary medicine, at a time when it can no longer offer a perfect protection.

We have just had an instructive instance of the disastrous results of neglecting the warnings of science in the case of the invasion of the *potato beetle.* Professor Riley warned the nation of the great losses that would result from its eastward progress, and showed how, by the outlay of a few thousands, it might be prevented from crossing the Mississippi. Instead of heeding his advice, the Missouri government, in a fit of blind retrenchment, abolished his office of State Entomologist, thereby effecting an immediate saving of $3,000 a year, while the *potato beetles,* allowed to cross the river at five separate points only, have laid the Eastern States under a contribution estimated at $100,000,000 per annum.

Even more disastrous would be the acclimatization of the *lung fever* in the Western States and Territories. Hence the urgent necessity that the country should foster veterinary sanitary science, and avail of it to obviate such a catastrophe. So, too, with regard to other animal plagues, indigenous and foreign. But to accomplish this in the best and cheapest manner, in a thinly peopled country like the United States, we must have the new style of practitioner, of human and veterinary medicine, and hence the surpassing importance of medical schools in which both will be taught in the most thorough manner. It speaks well for the advanced and far-seeing views of the Faculty of the University of Pennsylvania, that they are the first among American institutions of learning to have recognized the importance of this alliance between the two sister professions of medicine, and it is to be hoped that the Legislature will prove themselves equally liberal and true to the best interests of the country, in providing the means for a firm and permanent consummation of the union.

CULTURE OF INDIAN CORN.

By Dr. E. Lewis Sturtevant.

I have been asked to furnish directions for the culture of corn. In reply, I offer the results of experience on Waushakum Farm, where the corn crop has become a specialty and where the success has been satisfactory.

In New England, where a mixed husbandry prevails, the corn plant offers returns both in grain and fodder; and the latter is so important that it deserves careful consideration. Indeed, where the crop is dependent on artificial manures, the fodder production is the one feature of the crop which allows of maize being grown with profit. Thus, if the corn plant be analyzed, it is found to contain at the period of harvest, per bushel of grain raised, about 1.27 pounds of nitrogen, .63 pounds of phosphoric acid, and 1.54 pounds of potash. Placing the values at which these substances must be purchased in the form of commercial fertilizers, we have a value of forty-six cents removed in each bushel of grain with its corresponding fodder. Under the method of culture at Waushakum Farm, the cost for labor has been twenty-eight cents per bushel—paying one dollar and fifty cents per day wages per man and seventy-five cents per horse. This gives us a cost of seventy-four cents per bushel. Yet, if a value is given to the fodder, this seventy-four cents can be very largely reduced.

A careful estimate of the feeding value of the corn fodder, when properly harvested, and from an eight-rowed variety of corn, places it at three-fifths of good hay. As hay with us has an average value of twenty dollars a ton, this makes corn fodder worth twelve dollars a ton for feeding. Waushakum corn yields eighty pounds of fodder to the bushel of grain. This fodder value, therefore, of forty-eight cents, must be subtracted from the seventy-four cents as given above, and this makes the cost of growing our corn but twenty-six cents a bushel. The average price of corn in Massachusetts, for the past five years (1871–1875), has been ninety-eight cents. Subtracting, then, twenty-six cents from ninety-eight cents, we have seventy-two cents for the profit per bushel. As our average crop on artificial fertilizers has been eighty bushels per acre, we have realized a net profit, on the basis of these figures, of fifty-seven dollars and sixty cents an acre. If the fodder value is ignored, the net profit is but nineteen dollars and twenty cents per acre.

It is thus seen that there is a profit in our method of growing corn, and that the amount *figured* depends, in large measure, upon the value ascribed to the fodder.

Now, stover has many values. That from a coarse, rank-growing corn crop, with excess of stalk, and allowed to dry up on the field, is of little value. That from a fine-growing stalk, cut at the proper season, and well cured, is called by us worth three-fifths of an equal weight of hay. We, therefore, may be correct in our estimation, while another man, with a different variety of corn, may be equally correct in calling the stover hardly worth harvesting. We, however, know this: That our herd of Ayrshire cattle have been kept through the winter months—yielding milk and in excellent condition—with little other fodder than that from our corn fields, and our English hay thus saved added to the farm profit. This corn fodder was fed dry and uncut, and of the forksfull thrown before the cows but nine to ten per cent. was rejected. A change to hay did not increase the milk-yield, nor did the return to corn fodder diminish it.

Is it any wonder, then, that we ascribe value to the character of the seed we plant, so that we may derive profit from the straw as well as the grain? Indeed, it is from the consideration of the value of the corn fodder that we express our liking for an eight-rowed corn in preference to corn with twelve rows or more. In our experience we have found a small cob to be produced from a small stalk, and a large cob from a large stalk. Hence a coarse ear indicates a coarse fodder, and a fine ear a fine fodder. Hence an eight-rowed corn, which is more likely to have a small cob, is preferable for our use to a twelve-rowed corn which grows on a larger cob.

For a poor farmer, perhaps the fertilizer question is of more interest in connection with his crop than any other. For a good farmer, however, who intends to furnish his land with sufficient plant food, the fertilizer question is of small importance as compared with the seed. In one experiment carried out on the same field, treated as one field, and manured alike, one seed corn produced just double the yield of another seed corn. One seed corn, on an unmanured portion, produced at the rate of sixty-eight bushels per acre, to fifty-five bushels produced from another seed, on the same field, abundantly manured.

Let us see what the possibilities of the corn crop are. On Waushakum farm, we have planted in drills three and a half feet apart, and four kernels every nineteen inches of the drill. This figures up 31,000 stalks to the acre. If each one of these stalks should produce one ear nine inches long, and containing six ounces of grain, we would have 31,000 ears, which, multiply by six ounces, equals 186,000 ounces; now divide by sixteen, and we have 11,625 pounds. Now divide again by fifty-six, the number of pounds in a bushel, and we have for a result, 207 bushels of shelled corn. Shall any one say this is impossible? Suppose we plant in hills three and a half by three and a half feet each way, and five kernels in a place; we then have 17,780 stalks per acre. Allowing an ear to the stalk, as before, this would mean 106,680 ounces, or 6,667 pounds, or 119 bushels per acre.

When we consider that we can, if necessary, apply fertilizer sufficient to grow a thousand bushels, or one hundred, and that we can cultivate every day of growth of the crop, or every week, as we choose, we can readily realize that it is the seed which concerns us the most in giving a premium on a maximum crop. The fertility and culture is but a question of money; the seed which will produce 30,000 or 40,000 ears to the acre on any land, is the difficult thing to obtain. Let us consider the matter from another point of view. An acre is sufficient area to grow 200 bushels of corn, for it takes no more room to grow a fertile plant than an unfertile one; and we can readily find stalks which mature two, or even three, ears of corn, and rarely five ears. We have without difficulty, and with advantage, grown 30,000 stalks to the acre. In plots of limited extent, we have successfully grown at the rate of 40,000 seed, planted to the acre, and this seed with the suckers, have afforded at the least 50,000 stalks. We have fertilized for eighty bushels of corn, and except for the cost could as readily have applied sufficient for 800 bushels. We have harvested 128 bushels per acre from selected fields, and have averaged eighty bushels on a field of large extent for New England. Now, why cannot we obtain, then, a crop of 200 bushels of shelled corn? Evidently, because we have not had the seed which was fruitful enough through heredity to form one average ear to a stalk.

In the garden, we have through the application of root pruning, and the encouragement of suckers, obtained twenty-three ears of corn from one kernel planted, not all perfect, but five were, and the rest defective through deficiency of pollen and otherwise. I am sorry that the kernels were not counted, but they certainly must have amounted to 2,500 or 3,000, or a return of 2,500 or 3,000 for one. Under particular culture, nearly every seed can be rendered fruitful, but under slight difficulties, we can note a great difference in the hereditary stamina of each towards fruitfulness. This difference is well marked in field culture, and what we as farmers require is a seed wherein the tendency to fruitfulness is so developed through heredity, that all the kernels will be able to develop and mature, under proper conditions, at least one ear to a stalk.

It is therefore a primary effort at Waushakum farm to develop a variety of corn which shall possess, through heredity, this desired quality of fruitfulness, even so as to give us an ear under comparatively adverse conditions. I will give the process by which we hope to attain large crops within five years, through the value of our seed. It must not be overlooked, what has been said concerning fodder; our fodder must be small stalked, and not too abundant. It may be tall, but not coarse.

Our first endeavor was to secure an eight-rowed corn, of prolific habits, satisfactory fodder quality, and of strong race character. From such a corn, only the twin eared stalks were considered as suitable for furnishing seed. In September we pass through the fields and carefully select from these two-eared stalks, which we find the ears from which our seed corn is to be selected from at a later date, keeping the foddering habit of the plant from which the ears are selected constantly in mind. Let me quote from the Scientific Farmer of June, 1877, the further selection: "We had in one bin ninety and a-half bushels of ears. * * * These ears were picked over one by one, the most perfect being laid one side, until reduced to seven and a-half bushels of ears. These seven and a-half bushels were then taken into our sitting-room, spread on a duster, and just enough for one bushel of grain selected therefrom." These ears, which were to furnish the seed corn, were small in diameter, but large in kernel. The cob was but 12.15 per cent. in amount, small in diameter, and of even taper. The eight-rowed ear was as large at or near the tip as at the butt; the kernels perfectly even in the row, closely adpressed, and of even size from the rounding of the tip to the butt, and when the ear was broken from the stalk left a cup-shaped cavity. Weight sixty-four pounds to the struck bushel.

This corn, thus carefully selected, was planted in a field by itself, properly fertilized and thoroughly cultivated. In July, on the appearance of blooming, we passed through the field and castrated every imperfect stalk by removing the tassel, thus preventing, we hope, the fertilization of one seed by another plant possessing less strong fecundity, or any objectionable feature of growth.

The corn plant is almost tropical in its love for heat. Its roots attain their maximum rate of growth in a soil which is at least ninety Fahrenheit temperature. It cannot endure stagnant water, nor too much moisture; is a rapid grower, and its rank roots find their supply of food at the best amid decomposing vegetable matter. We hence select a field for its culture which is preferably in old sod, and in which and on which water never stands. This field is ploughed shallow so as to keep the sod near the surface, for we desire the decomposing sod where the heat is greatest, as thus the roots of the plant are encouraged to grow and feed in that stratum of soil which offers the most advantage. If our land was a heavy soil, and the under surface was not soft enough for the roots to penetrate, I would advocate running a sub-soiler beneath the turned sod. The *sod, however, must be near the surface*, and the sub-soil permeable to roots in order to obtain the best results. In our locality I feel sure that deep ploughing is an injury to a corn crop. A sod is not, however, essential for the growing of corn. In our experimental field of eight acres, we are now growing corn for the third year in succession, in order to test the Stockbridge fertilizer, and each year has promised and fulfilled a larger crop than its predecessor.

After ploughing, *shallow*, as I have stated, the Randall harrow thoroughly pulverizes the surface, and leaves a good seed bed. On this is spread by a broadcast-sower, this year, six bags of Stockbridge fertilizer, containing the nitrogen, phosphoric acid and potash which would be removed by a sixty-bushel crop of corn. It may be well to brush this fertilizer in with a light harrow, or ordinary brush harrow, but we as frequently leave it on the surface.

It is very important to keep any fertilizer used for corn as near the surface as is possible, for the soluble elements are carried downward with the rain, and it is of great advantage to have the plant-food near the surface when the heat encourages the roots to grow the fastest and feed the most. It is a great mistake to plough under manure for corn, if it can be as thoroughly incorporated with the soil by any other method. In localities fall manuring is found beneficial. In this case, the soluble matter of the dung is carried downward by the rain, to appear again on the surface upon the inversion of the soil by the plow. Next to the variety of seed used, I consider this matter of applying the fertilizer as of consequence upon farms where *culture* is practiced.

In planting we use a home-made machine, and plant in drills. The distances must be regulated by the variety of corn grown, for a large-foddered variety requires a greater space for growth than a smaller foddered variety. I do not believe in empirical rules, for each farmer should be guided by his own judgment. Principles, however, can be stated with confidence. The corn plant does well in lateral shade, but poorly under vertical shading. In our neighborhood, more farmers lose crop by planting at too great intervals than by planting too close. Indeed, it is an unsettled question with us as to how close it will answer to plant. A careful examination of our fields has invariably shown, that taking equal lengths of rows, the largest crop has always been obtained, under conditions otherwise identical, where the corn was the thickest. In fields where the adjoining rows have been obliterated, we can rarely detect any benefit to be ascribed to the opening of spaces. With our corn, we have concluded that from 30,000 to 32,000 kernels to the acre is about right; yet, as our practice is intended to be experimental, we shall probably vary this number in many cases.

Given sufficient fertility and the proper seed, yet, even then, something more is needed to secure a maximum crop. This is cultivation. Doubtless some of my readers are familiar with my advocacy of root pruning, but the majority are not. We will, therefore, outline the theory before stating the practice. Whenever a check is given to a plant—a check insufficient to destroy, but one which retards the growth of foliage, and one which is given to a plant otherwise well fitted both by soil and circumstance to develop seed—the forces of fruitfulness are stimulated so as to overcome the tendency to luxuriance of leaf. In many plants, the divided roots send out more rootlets from the cut, and thus the plant obtains a greater possession of the soil interstices and has its feeding power largely increased. Thus the check increases the maturing power of the plant, and the increased food supply forces the plant into the production of more fruit. Whether correct as a theory or not, it well pays in crop to cultivate *deep* and *as close to* the plant as can safely be done; and this as frequently as farm duties will allow, *up to the bloom* of the corn. After the blossom has appeared, any disturbance to the plant works an injury. We usually cultivate three times, and follow the later cultivations with the horse-hoe, which slightly ridges the plant and covers the weeds in the row. Experimentally, it well pays to use about 100 pounds of superphosphate per acre at the second cultivation, for the presence of this manure in the soil not only serves to supply food for the plant, but actually favors the development of fibrous roots—the coronal roots—of the plant, and thus increases its feeding capacity.

After the bloom, our fields receive no further labor until the harvest. In this, as a matter of convenience, and for the saving of labor, we stack the crop in the field and husk from the stack.

I will present our labor account with one field on nine and one-half acres, to date:

			PER ACRE.	
	Hours of man.	Hours of horse.	Hours of man.	Hours of horse.
Plowing in 1876	26.6	53.2	2.8	5.6
Randall harrowing	19	57	2.0	6.0
Turtle harrowing	10	20	1.0	2.1
Applying fertilizer (57 bags)	25	25	2.6	2.6
Planting	9	9	1.0	1.0
Re-planting	21	0	2.2	0.0
Hoeing (Ross hoe)	33	33	3.5	3.5
Hoeing (Victor hoe)	5.5	5.5	.6	.6
Hoeing (hand)	2	0	.0	.0
Hilling (Ross hiller)	37	37	4.0	4.0
Totals	188.1	239.7	19.8	25.2
Or per acre:				
1.98 days, man, at $1.50				$2 97
2.52 days, horse, at $0.75				1 89
Total				$4 86

It will be a matter of surprise to many to read how cheaply we cultivate our fields. Let it be kept in mind, however, that our soil is a light loam, without clay, and that we use fertilizers and horse labor wherever applicable, and all difficulty vanishes. The gang-plow turns twenty-four inches of furrow. Our rows are long and our fields smooth. Our implements are the best we can purchase for our purpose, and all the operations of the farm are supposed to have an intelligent planning and oversight. We keep our labor account in hours, not reporting the actual working time on the field, but all the preparation time which can fairly be ascribed to the crop.

When we consider the value of a corn crop in a rotation, the amount of the possible yield, not only in grain but in fodder, and the relative prices obtained as compared with other grains, the ease of its cultivation, its especial adaptation to chemical farming, and above all its certainty, it is indeed strange that the Eastern farmer has given it so little attention. The example of Waushakum Farm has done much towards increasing its culture in Massachusetts, and if this account will lead any Maine farmer to study into the corn crop and its adaptation to his land, we shall feel well repaid for the writing of this narrative.

THE HISTORY OF BUTTER.

BY HENRY A. MOTT, JR., PH. D., E. M.

The name *Butter* was applied in former days to a number of *metallic salts*, more specially to *chlorides*, which resembled butter in a melted state; for example, "butter of antimony"—sesqui-chloride of antimony (antimonic chloride); butter of arsenic, bismuth, tin and zinc, which were the anhydrous chlorides of those metals.

Bog butter is a fossil butter found occasionally in the Irish peat bogs. It is believed to have been made by man.

Rock butter * is an iron alum which appears as a pasty exudation on alum slates.

Butter is obtained in Africa from the *shea tree.*† This tree grows naturally and very abundantly in the woods. It resembles in appearance the American oak, which bears a nut like the Spanish olive. The kernel is enveloped in a sweet pulp under the rind. If this is boiled in water it yields a butter which is said by Mungo Park to be whiter, firmer, and of a richer flavor than any he had tasted from cow's milk, and which will keep without salt for a whole year. The natives call it *shea toulou*, or tree butter, and large quantities are made.‡

HISTORY OF BUTTER. In the Old Testament we find mentioned the word "butter," as for example:

Gen. xviii., 8, "And he took butter and milk;" Deut., xxxii., 14, "Butter of kine and milk of sheep;" Judges, v., 25, "He asked water and she gave him milk; she brought forth butter in a lordly dish;" II. Sam. xvii., 29, "And honey and butter and sheep and cheese of kine;" Job xx., 17, "He shall not see the rivers, the floods, the brooks of honey and butter;" Job xxix., 6, "When I washed my steps with butter and the rock poured out oil;" Isaiah vii., 15; "Butter and honey shall he eat;" Isaiah vii., 22, "And it shall come from the abundance of milk that they shall give that he shall eat butter, for butter and honey shall every one eat that is left in the land;" Prov. xxx., 33, "Surely the churning of milk bringeth forth butter;" Psalms iv., 21, "The words of his mouth were smoother than butter, but war was in his heart."

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* Johnson's Cyclopedia, p. 687. † Mungo Park. ‡ Sci. Amer., Oct. 25, 1873.

Most Biblical critics agree that the word translated "butter" in our version of the Old Testament is translated incorrectly.

I wrote to the Rev. Dr. Howard Crosby, who is considered high authority, with respect to the subject. He said: "The word for butter (Eng.) in Gen. xviii, 8, and in Prov. xxx, 33, is '*chemah.*' It is from the verb '*chamah,*' which means (in Arabic, for it is not used in Hebrew) 'to *curdle.*' 'Butter' is a wrong translation. It should be 'curdled milk.' So in Judges v, 25; Isaiah vii, 22, and in several other places." Making then, the proper corrections above, Gen. xviii, 8, "And he took curdled milk and milk;" Deut. xxxii, 14, "Curdled milk of kine and milk of sheep," etc. With respect to the meaning of Prov. xxx, 33, "Surely the churning of milk bringeth forth butter," there has been considerable discussion. In Flint's work * the above expression, he says, would be better translated, according to the best critics, "The pressing of the milker bringeth forth milk," or "The pressing of milk bringeth forth cheese." The Rev. Dr. Crosby kindly translated the expression for me. The following is the Hebrew: "*Mitz chalab yotzi chemah.*" "*Mitz,*" says the Doctor, is from the verb "mutz" or "matazh," meaning "to press." The word "chalab" is the common Hebrew word for new "milk." It is from a root which means "to be fat." It is translated "milk" rightly in Gen. xviii, 8. The strict rendering of the above expression is, "The pressure of milk bringeth forth curdled milk," (bonny clabber). This translation will be seen to agree with the last one mentioned above, as found in Flint's work. It is evident from the above, that butter was unknown to the ancients at that time.

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* Dairy Farming, p. 218.

Herodotus, the Greek historian, in his account of the Scythians, describes a process for making butter. This is supposed to be the oldest reference. The word *buturon* first occurs in Hippocrates, who was nearly contemporary with Herodotus, in the fifth century before Christ. "The Scythians," says Hippocrates, "pour the milk of mares into wooden vessels and shake it up violently, making it foam, when the fat part, which is light, rises to the top and becomes *butyron*." He also speaks of cheese.

The poet Anaxandries, who lived a short time after Hippocrates, in describing the marriage of Iphicrates, and the entertainment there given, says that the Thracians ate butter, which the Greeks at that time considered a wonderful kind of food.

The word butter does not occur in Aristotle, and he even scarcely alludes to it, though he gives very correct information with respect to milk and cheese, which seems to imply careful observation.* In Strabo three passages refer to the subject, but little information can be elicited from them. Plutarch relates that a Spartan lady paid a visit to Berenice, the wife of Dejotarus, and that the former smelled so much of sweet ointment and the latter of butter, that neither of them could endure the other. "We are not told what kind of ointment it was, but we can safely assert that the butter must have been very rancid." †

Œlian states that the Indians anointed the wounds of their elephants with butter. Dioscorides, 33 B. C., says that butter was prepared from the fattest milk, such as that of sheep or goats, by agitating it in a vessel till the butter separated. To this butter he ascribes the same effects, when employed externally, as those produced by it at the present day. It appears he was the first writer who observed that butter might be poured, in a melted state, over pulse vegetables instead of oil, and that it could be used in pastry. A kind of soot was at that time prepared from butter, which was applied externally in inflammation of the eyes and other afflictions. For this purpose the butter was burnt in a lamp, which was constantly refilled, until a sufficient quantity of carbon had been deposited in the vessel placed over it.

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* Muspratt's Chem., p. 397.

† Sci. Amer., Oct. 25, 1873.

Galen * remarks that the secretion of the cow makes the best butter; that made from the goats' being less rich, and asses' milk giving the poorest. He expresses his astonishment that Dioscorides should say that butter was made from the milk of sheep and goats. Butter, says he, may be very properly employed for ointments, and when leather is besmeared with it the same purpose is answered as when it is rubbed over with oil. At the end of the second century, butter appears to have been very little known to, or used by, the Greeks or Romans. The Roman writers, who give an account of the ancient Germans, relate that they lived chiefly upon milk; on one point, however, they disagree, some of them saying that they used cheese, while others affirm that they were not even acquainted with the method of preparing it. Pliny affirms that they did not make cheese, but butter, which they used as a pleasant kind of food.

The principal use of butter among the Greeks and Romans was as an ointment and a medicine. The Romans were accustomed to anoint the bodies of their children with it to render them pliable, and the Burgundians extended its application by using it as a hair oil.

The ancient Christians of Egypt burned butter in their lamps instead of oil; and in more recent times it was used for the same purpose in Roman Catholic churches, during Christmas festivals, to avoid the great consumption of olive oil. The cathedral of Rouen has a tower called the "butter tower," from the fact that the Archbishop of Rouen, in A. D. 1500, finding the supply of oil to fail during Lent, permitted the use of butter in lamps, on condition that each inhabitant should pay six derniers, with which money the tower was

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* Muspratt's Chem., p. 397.

built. There are other "butter towers" at Notre Dame, Bourges, etc.*

It is evident from the above facts, that the discovery of butter cannot be attributed either to the Greeks or Romans. The Greeks were undoubtedly made acquainted with it by the Acythians, Thracians and Phrygians, and the Romans by the Germans. Butter is never mentioned by Galen and others as food, though they have spoken of it as applicable to other purposes. Apicues takes no notice of it, nor is there anything said in that respect by the authors who treat on agriculture, though they have given accurate information regarding milk, cheese, and oil. This may easily be accounted for by the fact that the ancients were entirely accustomed to the use of good oil. Butter, even at the present day, is but sparingly used in Italy, Spain, Portugal, and the southern parts of France. Olive oil, in many instances, taking its place, but it is sold in the apothecaries' shops for medicinal purposes.

In the East Indies the natives use *ghee*, which is butter clarified by boiling.† During the ages of paganism, butter appears to have been very scarce in Norway. Mention is made by historians of a present of butter so large that a man could not carry it, and which was considered as a very respectable gift.‡

It is very probable that the formation of butter was discovered by accident, in the transportation of milk in skins, which are still used in Barbary. In that country the Arabs churn their cream by suspending it contained in skins of goats, in their tents, and pressing it to and fro. Dr. Chandler, in a journey from Athens to Corinth, noted the mode of churning in the Levant. It consisted in securing the cream in skins and then treading them with the feet. In Bengal, probably owing to indisposition to exertion, in consequence of the excessive heat, they manage to make butter come by simply turning a stick around in the milk, but the product cannot be large.§

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* Sci. Amer., Oct. 25, 1873.

† Johnson's Cyc., vol. 635. (Chandler.)

‡ Muspratt's Chem., p. 397.

§ Sci. Amer., Oct. 25, 1873.

AN ESSAY ON FARM DRAINAGE.

By H. W. S. Cleveland.

[The following, though written with particular reference to Illinois, contains so much that is applicable to Maine and its information is so much needed by our farmers, that I offer no apology in presenting it to their attention.]

In a report made nearly thirty years ago, to the State Agricultural Society of New York, by a committee appointed expressly to consider the question of drainage, I find the following paragraph:

"There is not one farm out of every seventy-five in this State, but needs draining—aye, *much* draining, to bring it into high cultivation—nay, we venture to say that every wheat field would produce a larger and finer crop if properly drained."

No agriculturist who is familiar with the topography, soil and present condition of culture of Illinois, as compared with New York when the above was written, will feel any hesitation in asserting that the above verdict is more emphatically true of the former State to-day, than it was of New York at the time it was rendered.

The great agricultural necessity of our State is a thorough system of under-drainage, not alone of the swamps and sloughs, which occupy so large a portion of her territory, but of the higher prairie lands, which comprise the great harvest fields of the State. Comparatively speaking, there is scarcely an acre of these lands whose productive powers might not be very greatly increased by a judicious system of tile drainage.

Up to the present time it may be said, almost literally, that no attempt at drainage has been made, except of the sloughs, which are found of greater or less extent on every prairie farm. The character of these are too well known to require description. They often occupy a very large portion of the farmer's possessions, and are always an eye-sore, and a source of annoyance, expense and ill-health, yet they contain the richest soil of the whole farm, composed of the surface washings of the adjacent higher lands, and the decomposed vegetable matter which annually grows in rank luxuriance, and adds its decaying elements to the previous store of fertilizing material. The profit to be derived from the drainage of these sloughs is so obvious and direct that the only wonder is that they are ever suffered to remain, when they might so easily be converted into the most productive portion of the farm, yet it is only occasionally that their redemption has been thus secured, and on the great majority of farms throughout the State they still disfigure the land, intersecting the arable fields with an irregular and unsightly area of worthless marsh. It is to these tracts thus far, that drainage has been almost exclusively applied, and the process for the most part has been of the simplest kind, consisting of a main drain of five or six inches diameter carried up from the outlet and following the course of the centre of the slough through all its meanderings, with occasional side-drains where its width seemed to render them necessary, or where an opportunity occurred to connect with smaller sloughs on higher land. In all cases where such tracts as these have been drained, the result has been their immediate conversion into dry, firm soil of luxuriant fertility, susceptible of cultivation as early in the season as the higher lands, and greatly exceeding them in productive power. That such should be the case, is so evident a proposition and has been so often demonstrated in practice, that no man of ordinary intelligence would presume at this day to deny its truth, and this work of draining the sloughs should be in all cases the first step in a system of thorough under-drainage. For the main drains, into which the others must be led, will of course occupy the lowest lines, and follow the course of the sloughs from the outlet to the head. It is therefore a matter of vital importance to determine at the outset the relative heights of the different points in the course of the main drain, to secure first a regular descent sufficient to insure a constant outflow, and secondly to keep it so much lower than any of the fields which may ever have to be drained into it, that no portion of any such side-drain need be less than three feet below the surface. A moment's reflection will enable any one to perceive that a careful attention to this matter before beginning the work may save a very large outlay of money and labor at a later period.

Farmers not unfrequently assert that they cannot drain their lands for want of sufficient fall; and in so level a country as prevails generally in Illinois, it is not surprising that this apprehension should be common. But it should not be admitted without careful investigation. Very few men are competent to judge, without careful measurement, of the relative height of different portions, even of an area which can be scanned at a glance; and no man can tell by the eye whether the descent is sufficient for purposes of drainage, on what is seemingly a level area of considerable extent. Inexperienced persons are always surprised to find how slight a fall is absolutely necessary for a sufficient outflow, provided the descent is of even grade, and the tiles laid with such care as to offer the least possible friction or obstruction to the current. It is always desirable to preserve as even a grade as possible throughout the line of descent, yet it is often a difficult rule to follow. Where the fall is very slight, however, it is absolutely essential to success that no such obstruction as even a continued level space should be encountered. With straight lines, even grade, and smooth tile, a fall of two and a half inches in a hundred feet will suffice for perfect drainage. No man can perceive with the eye alone so slight a variation from a level as this, neither would it manifest itself by the flow of surface water through the usual obstructions of swamp vegetation. In all cases of doubt, therefore, and in many cases where the proprietor is satisfied that his case is hopeless, the application of a leveling instrument may reveal possibilities of relief not previously suspected. The lowest point at which an outlet can be secured having been determined, it will be easy to ascertain what degree of fall can be secured, and also the minimum depth at which the main must be laid, to allow sufficient fall from the remotest point of any of the side drains.

Having thus glanced at the subject of swamp or slough drainage, the necessity of which, on the score of profit or health, it is to be presumed no one will deny, I come next to what I conceive to be a more important subject of discussion, because its necessity is less obvious, and its expediency is still doubted by many intelligent farmers who have not had an opportunity to witness its effects—I mean the drainage of the higher lands, the surface of which is not overflowed, and is only occasionally and temporarily too wet for cultivation. Such are the uplands of the prairie farms, which constitute the arable lands now under cultivation throughout the State. Rich as these lands undoubtedly are, their productive power is susceptible of enormous increase, while the uncertainty arising from unpropitious seasons might be permanently averted by thorough and systematic under-drainage.

The necessity of drainage is not to be determined by the quantity of water which falls or flows upon the surface, nor upon the power of the sun to carry it off by evaporation; but upon the character of the sub-soil. If that is of sand or gravel, the water will pass off below by natural drainage; but if the sub-soil is clay or other impervious substance, the water is checked in its downward course and remains stagnant or bursts out upon the surface in the form of springs. Most of the prairie lands are of the latter character, and wherever such sub-soil exists the land will not only be improved by tile drainage, but it may be said that such drainage is absolutely essential to its proper development and culture. To question the necessity of the process is little less absurd than it would be to ask whether it would be improved by plowing, instead of making hills for corn in the prairie grass with a hoe or spade. All lands require drainage which, *at any season*, contain too much water—that is, which hold at any time of the year more moisture than is good for the crops, and causes them to suffer, either by freezing out in winter, or having their roots in water during the growing season. Drainage has been appropriately defined as "the art of rendering land not only so free from moisture that no superfluous water shall remain in it, but that no water shall remain long enough to injure or retard the healthy growth of such plants as are required for the sustenance of man or beast." There are some plants, as rice and cranberries, which require a wet soil, but most of those which are useful to man, are drowned by being overflowed for a short time, and are injured by any stagnant water about their roots.

The soil of the prairies, in most cases, is underlaid with clay, which not unfrequently contains a mixture of metallic oxides, which cause it to form a substratum almost of the nature of rock, and known commonly among farmers as "hard pan." It is a common impression that clay is impervious to water, and that, therefore, a clay soil—and particularly if it has assumed the solid form of "hard pan" under the surface—can not be drained with tile, and especially if the tile is laid lower than the "hard pan." But that such land is not absolutely impervious is proved by the fact that it is very wet in the spring at almost any depth, while in the latter part of the summer it becomes dry and hard. How comes it to be soaked at any time, if water does not go into it? And how comes it dry, if water does not come out of it?

The facts that clay will readily absorb a great deal of water, and that it may be subsequently dried, proves conclusively that it is not impervious to water, but they do not prove that water will pass through it with sufficient rapidity to answer the practical purposes of drainage. It is nevertheless a fact that owners of clay farms almost invariably overestimate the difficulty of draining their land. They know that puddled clay is used for the bottom of ponds, canals, etc., and is nearly or quite impervious. But such is not its natural condition, and it is only reached by working and beating it while wet, or, as in the case of the "hard pan" sub-soil, by continued pressure from above. Nor can clay be kept in this condition except by being constantly wet. If once dried, or subjected to the action of frost, it resumes its natural porous condition.

If in laying drain tiles in a clay soil, the clay which is taken out of the ditches is replaced after the tiles are laid, while it is still wet, the effect will be the same as if it were puddled, and the water will stand on the surface directly over the drains. A single inch of such clay will prevent the water from passing through as effectually as any greater thickness. But if it is dried before being replaced it will lose this quality and will never afterwards acquire it again, because it will be continually subjected to a process of alternate wetting and drying, instead of being constantly soaked with standing water. In the same way whenever drains are introduced in a field of which the sub-soil is a stiff clay, the water begins to pass off, and the soil and sub-soil necessarily begin to contract, and as they shrink, they crack and thus afford more easy passage for the water. With every change from wet to dry, the facility is promoted. If sub-soil ploughing is also practiced, it will greatly promote the process of drainage, and in fact it should always be considered a necessary accompaniment of the laying of drain tiles in such a soil.

The opinion is often expressed by farmers that it will not do to lay the drains at a greater depth than the hard sub-soil at which the water commonly stands. This is very often not more than two feet below the surface, and the theory is, that being impervious, the drains can only attract and carry off the water which stands above the surface of the hard pan. Experience however has proved that by laying the tiles at a greater depth, the water will find its way to them—perhaps slowly at first, unless aided by sub-soil ploughing, but with increasing celerity from year to year, till the whole mass, to the depth at which the drains are laid, had become permeable. There can be no more mistaken and foolish economy therefore, than shallow draining, which in fact is simply the abandonment of the chief advantages which can accrue to the soil from the practice. No person whose experience has been sufficient to give weight to his opinion, will admit that a less depth than three feet is worthy of consideration in any case, and in clay soils, or loams having a clay sub-soil, the advantages of a greater depth are so obvious and important, that it may be said—speaking comparatively—that no man can afford to lay his tiles at a less depth than four feet. However stiff a clay may underlie the top soil, its character would be effectually and permanently changed in a few years by a system of drains not less than four feet deep, and not more than forty feet apart, and the improvement would be greatly accelerated if sub-soil plowing were also made use of. From data received from a great many sources, I feel no hesitation in expressing my belief that the crops of Illinois might be doubled by a judicious and thorough system of under-drainage. A vast extent of fertile land might thus be created where now are only sloughs and swamps, productive only of disease, and there is scarcely an acre of the higher prairie lands which would not be sufficiently benefited by the process to warrant the investment. The only exceptions are the comparatively few cases in which the prairie soil is underlaid with gravel.

In considering the subject it is important to bear in mind that the improvement is not only a permanent one, the beneficial effects of which are to endure for all time, but that years must elapse before the full development of its action on a clay soil will be attained. In soils that have been properly drained, the injurious effects of wet or dry seasons are comparatively unknown. Water is never held in sufficient quantities or for such length of time in the soil as to prove seriously destructive; and, on the other hand, such soils never become parched or baked to such extent as to check materially the growth of crops.

The mechanical effects of drainage are to deepen the soil and promote its more thorough pulverization. Its first effect is to dry its surface soil by drawing out of it all the surplus moisture, so that in early spring or late autumn it may be worked with the plow as advantageously as at mid-summer. A wet soil can never be properly pulverized, and the plowing or working a clay soil, or even a heavy loam, when wet, tends only to puddle it and render it less pervious to water and air. Rain water contains a great quantity and variety of fertilizing substances, and it deposits them in the soil during its passage through it. Both these facts are perceptible to the senses without resorting to chemical tests. If we consider the inconceivable amount and variety of impurities which are continually arising from the surface of the earth in the form of gases, created by the decomposition of animal and vegetable matter, we can easily understand that the air must be heavily charged with them. They would indeed very soon suffice for the destruction of animal life, but for the provision for their withdrawal from the atmosphere and restoration to the soil by the falling rain. The air is pure and sweet after a shower, because the rain has absorbed and carried off the offensive matter with which it was charged, and the rain water is nauseous and unfit for animal consumption, because it contains these impurities. But it filters through the soil and emerges as a spring of crystal purity, having deposited in the soil all the fertilizing ingredients it contained, just where they were within reach of the hungry plants which feed upon them. It would be hard to find in the whole system of Nature's wonderful works a more beautiful or perfect illustration than is here afforded of the simple and quiet manner in which the most important results are attained, and the economy which forbids the loss or waste of the smallest particle of the material with which her storehouse is filled. But in order to insure the retention in the soil of all this fertilizing material, it is essential that the water should filter through it and pass off. If its outflow is checked, and it remains stagnant, it retains its impurities, as is evinced by the nauseous character of the water of swamps and sloughs, as contrasted with that of springs. It has been estimated, and is susceptible of demonstration, that the fertilizing material imparted to the soil by the passage of rain water through it is equivalent in the average rain-fall of a year to three hundred weight of Peruvian guano per acre.

I have taken pains to explain at length the manner in which the elements thus restore to the earth continually the ingredients which furnish the food of plants, which in turn are consumed by animals and given off to the air by decay and combustion, to be again returned to the soil in a ceaseless round of active usefulness. Drainage is merely a mode of availing ourselves of the forces of nature, to secure results which man's unaided strength would fail to accomplish, and the above is only one of the forms in which we secure the benefits we seek.

It would exceed the limits within which this essay must be comprised to explain at equal length the various mechanical and chemical processes by which the action of natural agents is facilitated by means of under-drainage. Those who are curious on the subject, as every farmer should be, are referred to the treatises of French and Klippart on farm drainage, in which the history, theory and present practice are given in detail, and which no land owner can peruse without an increased interest in his possessions, and a keener perception of the possible development of their productive power. He will find it clearly proved and demonstrated by invariable experience that drainage lengthens the season of labor and vegetation, since drained lands are in condition for culture much earlier in the spring, and continue so much later in the fall, than those which are undrained. It promotes fine tilth by rendering the soil more friable. It prevents surface washing by allowing the water to percolate through the soil, thus securing the benefit of whatever fertilizing material it contains, instead of adding its own ingredients to those with which the water was previously charged. It diminishes evaporation, and thus raises the temperature of the soil.

It lessens the chance of the winter-killing of crops. It facilitates the hauling of loads, and renders the land less liable to injury from the treading of cattle. It facilitates the destruction of weeds, because the soil does not cling in a mass to their roots when torn up by the hand or plow.

It preserves a more equable degree of moisture in the soil under all circumstances, since it not only renders its saturation with water impossible, but keeps it in such a condition of pulverization, that in times of drought it absorbs moisture by capillary attraction from the air, and never becomes parched and baked as is the case with undrained lands. With proper drainage, the amount of moisture retained in the soil under all the varying circumstances of wet and dry seasons, can be so nearly equalized as to prevent the disastrous effects resulting from either extreme.

With such evidence of the truth of all these statements, that no room is left for argument in opposition, the question of drainage as an essential requisite to the highest condition of culture, of all lands not naturally drained by a sub-soil of sand or gravel may be considered as settled.

Whether it will pay to do it, however, must of course be determined in every instance by the proprietor himself, since he alone can judge of the relative value of the improvement, to the condition of his own finances, which must form an important factor in the sum. In many cases, no doubt, the increased return would be so large, and would follow so immediately upon the improvement, that the proprietor would be justified in borrowing money for its execution. Such is the case with swamps and extensive sloughs, where land which was previously absolutely worthless, might be converted at once into fields of such fertility that the first crop would more than repay the outlay. If the proprietor is "well to do" and can afford the cost of drainage without inconvenience or embarrassment to himself, it is certain he can make no wiser investment than in a thorough, systematic and judicious system of under-drainage, first of sloughs or swamps, and then of all uplands of a clayey nature or having a clay sub-soil. It is worthy of remark that the men in every community who spend their money most freely for substantial improvements of this kind, (improvements which make no show except by the increased returns they afford) are the ones who by their general good management have acquired the character of money-making farmers; men who look very carefully at probable returns before expending a dollar. With them it is not an experiment. They know that drainage is just as essential to productiveness as thorough culture, and in fact thorough culture is impossible without it, and that farming like any other business must be done thoroughly, in order to be profitable.

And that last remark reminds me of the necessity of cautioning farmers against the folly and extravagance of attempting to do the work of drainage in a cheap and inefficient manner. There are indications that the conviction of the necessity of it has become so wide-spread that it will ere long be apt to break out in the form of an epidemic, in which the necessary precautions will be lost sight of in the feverish anxiety to secure the results, which are only the reward of conscientious performance of the work.

I have spoken elsewhere of the importance of securing even grades, particularly where the fall is slight. If a rapid descent in one place is succeeded by a nearly level grade, the pipes become filled and the water sets back, causing an outflow at the joints. For the same reason the course of the drains should be as nearly straight as possible, since at every angle or curve there must be increased friction and pressure; and finally it is important that the tiles should be smooth inside and the ends fitted neatly against each other, so that there may be the least possible interruption to the smooth and even flow of the water.

No portion of a system of drainage demands more careful consideration than the outlet. It is, of course, essential that it should be enough lower than any portion of the lands that are to be drained by it to admit of sufficient fall for the passage of water from the heads of its most distant tributaries. Yet it must be high enough above the level of whatever water it empties into to prevent danger of its being overflowed and the drainage water dammed back in the pipes; and, as I have already remarked, in all cases where there is not sufficient inequality of surface to render it obvious that every field on the farm can be drained into the mains without difficulty, the first point to determine in arranging the system of drainage is the lowest level at which the outlet can be set to insure a constant out-flow. For of course the level of every other point must be determined by it, or at least must be high enough above it to secure a grade of at least 2½ or 3 inches in 100 feet. On level prairie farms it may sometimes be difficult to secure this fall without bringing the upper portions of the drains too near the surface for efficient action. It is better, therefore, to incur the small expense of having the levels taken before the work is begun than run the risk of the great cost of reconstruction. Most farmers think themselves competent to the work of laying out and constructing their own drains without the aid of an engineer, or even a surveyor. But apart from the difficulty—I had almost said *impossibility*—of ascertaining the levels and arranging the grade of the bottoms of the ditches so as to preserve an even fall without careful adjustment by a leveling instrument, there is great danger that inexperienced persons may make mistakes in locating their drains which may cost them very much more than the services of an engineer. The work should never be done without a careful consideration of the probabilities of future extension. The farmer may at first think only of redeeming a single tract of wet land, and lay his tiles with reference to that alone. But all experience proves that men who once begin the work of draining their farms are seldom satisfied till it has been extended over the whole area, and it often happens that the subsequent work involves the necessity of rearranging that which was done first, an expense which might have been saved by timely forethought.

There can be no question that the wisest and best course to pursue, even if the land owner intends to do the work of construction himself is to have a plan prepared by an experienced engineer, showing the exact location and depth of every main and side drain, after an accurate survey of the ground. With such a plan to refer to, the farmer can go on from year to year, doing as much or as little of the work as he may deem best, but always knowing what he is about, and working to one end. And when done, the same plan will enable him at any time thereafter to find any point to which he wishes to obtain access.

I do not propose in this essay to give detailed instructions for the performance of the work of drainage, which would require greater space than can here be afforded; but my wish is to set forth the risks attendant upon poor construction, with sufficient clearness to warn the farmer against going to work ignorantly. If he then declines to employ an experienced man, or to procure and study the treatises which furnish detailed instructions, he takes his own risk, and has no one but himself to blame for the consequences of his own blunders.

One of the most common errors of inexperienced persons arises from the impression that tiles are a needless expense, and that the work can be as effectually done, and at much less cost, by using plank, stones, brush, or other cheap materials, or that the object can be attained by simply cutting ditches and leaving them open. It may sometimes be necessary in draining swamps to open a canal of sufficient depth and magnitude to carry off the outflow of all the drains. But except in such cases of necessity, open ditches are such a slovenly and wasteful mode of drainage that no farmer who has a just regard for principles of economy, or for his own reputation as an agriculturist, would admit them as permanent occupants of his premises.

In places where stones are so plenty that they have to be gathered in piles, or carted off before cultivation can be successfully prosecuted, it may be less expensive at the outset to use them for drains, and for a time they will prove effective, but will inevitably become choked in a few years. There is little chance of such material being used in Illinois, but it is not unlikely that farmers may in many cases be tempted to construct their drains of plank. It is a "penny wise and pound foolish" economy to make use of any such perishable substitute for tiles, which, if of good quality and judiciously laid at a proper depth, may be relied upon as constituting a *permanent* improvement.

"In the whole process of draining," says an experienced engineer, "there is nothing more important than permanent and substantial work at the outlet." It is the point, of all others, where obstruction is most likely to occur. Everywhere else the tiles are protected by the earth above them, but the outlet is exposed to the action of frost, cattle, mischievous boys, and vermin and reptiles, which are sure to seek a harbor in its cavity unless prevented by a proper guard. It is essential, therefore, that the outlets shall be as few as possible, and always well secured by a frame work of timber or stone, and guarded by grating or wire network, sufficiently fine to prevent the entrance of animals or reptiles of any kind.

So little thorough work of under-draining has been done in one part of the State, that it is difficult to find examples of upland drainage, without going outside our own boundaries. No man, however, who is familiar with its principles will doubt the benefit of their application to our soil.

The report of this department for 1875 contains a valuable and interesting communication from Messrs. Spaulding & Co., nursery men, near Riverton, Sangamon county, on the effect of draining a tract of 80 acres. The soil of the tract is a strong clay, or sandy loam sub-soil, reddish clay, with occasional sandy loam intermixed. The inclination of the land is to the south, and it is intersected by three low ridges, two of which extend nearly across the tract, the other about half way. Most of the land would have been considered sufficiently dry for agricultural purposes, but the low land was too wet for cultivation.

Mains of 5 inch tile were laid between the ridges from 3 to 4½ feet deep, and laterals of 2, 3 and 4 inch tile were connected with them at intervals of 30 feet. This general plan was carried out over the whole area, and only varied as the character of the surface and economy of construction required. No great variation, however, was necessary, as the inclination of the surface was quite regular, and the laterals were mostly laid at right angles with the mains, except that near the point of junction, they are curved a little so as to discharge their currents somewhat in the same direction as that in the main.

They say of the results: "These tile drains have been in operation for the past six years. We have grown nursery stock most of the time on the entire 80 acres, and for our business the value of the land has been increased from one to two hundred per cent. We have no doubt that our success rests greatly on our tile drained land, and we believe it would prove of the utmost benefit to farmers generally, if they would lay mains of 4 and 5 inch tile in the depressions of their lands and so locate them that they could at any time in the future attach all the necessary laterals. From our experience in tile draining, and the benefits derived therefrom, we have no doubt that there are very many farms of 160 acres in the State of Illinois, on which a single mile of drain tile, properly located at a cost of $175 or $200, would enhance the value of the farm $1000. The past very wet season has proved more than ever to us the value of the drain, since we never before made so perfect a success of all our nursery crops."

This brief but succinct statement comprises in itself all the essential truths which any amount of experience could furnish, and it is very evident that a realizing sense of the necessity of under-drainage in order to the development of the full productive powers of the land, is becoming widely established in the minds of farmers throughout the State.

Manufactories of drain tiles are increasing rapidly, and those which are already established and are known as reliable for good work can hardly keep pace with the increasing demand for their wares. There is great room for deception in the manufacture by the use of poor clay, or even clayey loam mixed with clay, and there can be no more foolish economy than in laying poor tiles because they can be had at a low price.

The drainer's work, like the undertaker's, is buried out of sight, but though it may be true that "dead men tell no tales," it is by no means true that drain tiles will preserve the secret of rascality that is buried with them. If defective, they will certainly make it known, and the proprietor must suffer the penalty of his own penuriousness by being forced to do the work over again.

In the whole catalogue of agricultural operations, there is no one which demands more care to secure good material and thorough work than tile drainage. In treating the question of its cost, it is not putting it fairly to state simply its cash value. A cash estimate looks larger to farmers than an estimate in labor. Drainage can be performed principally by the same labor as fencing. If a plan for the work is first carefully prepared, the labor of its performance may be extended over a series of years, so that no oppressive burden need be assumed at once, and every year's work will be an advance toward the completion of a full and perfect system, which, once established, will constitute a permanent addition to the productive powers of the farm. Labor thus performed at periods of comparative leisure, cannot justly be estimated at the rates at which it could be secured on contract, but should rather be regarded by the farmer as an investment of time and labor which would otherwise be turned to no profitable account. Few farm operations would pay expenses if every hour of superintendence, and every hour of labor of man, boy and beast were charged at its cash value.

The ordinary cost of cutting ditches and laying tile at an average depth of three feet may be stated at thirty cents per rod when done by hand. There are various machines for expediting the labor of cutting the ditches and laying the tile, some of which, there is every reason to believe, are effective, and capable of reducing very considerably the cost of the work. With the increasing demand, these machines will doubtless become common, and their proprietors will make a fair profit by taking work on contract at such low prices as will render hand labor extravagant in comparison. Unfortunately, the habit of puffing worthless as well as valuable articles has become so common, that all published commendations are regarded with suspicion, and I refrain, therefore, from offering an opinion on the merits of any of the machines which have been introduced. For a similar reason, I decline to recommend any particular manufactory of drain tile, but simply express my conviction that the best is the cheapest, and a little care in investigation will enable an inquirer to ascertain where a reliable article can be had.

Doubtless much money and labor will be vainly expended on cheap material and shallow work, by men of shallow brains, before the folly of such attempts will become fully appreciated. But the great question will not be affected by the blunders of individuals, and the work of drainage will go on in a rapidly increasing ratio, which will make itself manifest in the enormous aggregate increase of cereal productions.

It has been said by distinguished agriculturalists that Illinois comprises in one body the largest area of equally fertile lands to be found on the face of the globe. It may be added, that the only thing wanted for the full development of its productive power, is thorough and systematic under-drainage.

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